Misr University for Science and Technology

Faculty of Engineering

Construction Management Project

Graduation Project Report

Spring 2025

Koning Food Industrial Factory

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Ayman Bashir

Hazem Atef

Ibrahim Tharwat

Nader Gehad

Supervised by: Prof.Dr / Atef A. Ragab

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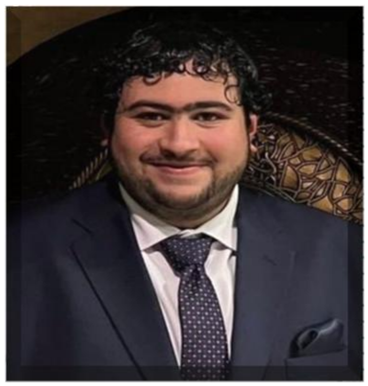
CONSTRUCTION AND MANAGEMENT DEPARTMENT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Moreover, we will never forget to spread our thanks to
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Teaching staff including our professors and teaching assistants for their help and guidance throughout the years of our Academic studies.

CHAPTER (1)

INTRODUCTION

Chapter 1: Introduction

1.1.-Project Name: Konning Food Industries

1.2.-Project importance:

We are committed to the leadership of the snack food industry in local markets so we must manage all the energies and material So that we will save time and money in phase of construct the building and we will increase the rate of production than other old factories and it will be easy to control and revisions.

1.3.-Project Description:

Koning Food Industries is one of El Sewedy Electric Group startups, established in 2017, producing confectionery & Baked Foods.
Koning Food Industries – KFI, A Food Industries Factory on plot9, Pyramids Industrial parks ,10th of Ramadan Industrial Zone.
The project land area is approximately 18,000 SQM, 180 m in length and 100 m in width.
Plant consists of 25 steel frames, one frame every 6 meter, There is a workers building, an administration building, a guard building, and an underground water tank.

1.4.-Project Components:

The project design criteria consist of two main concepts :

1.4.1.Process flow:

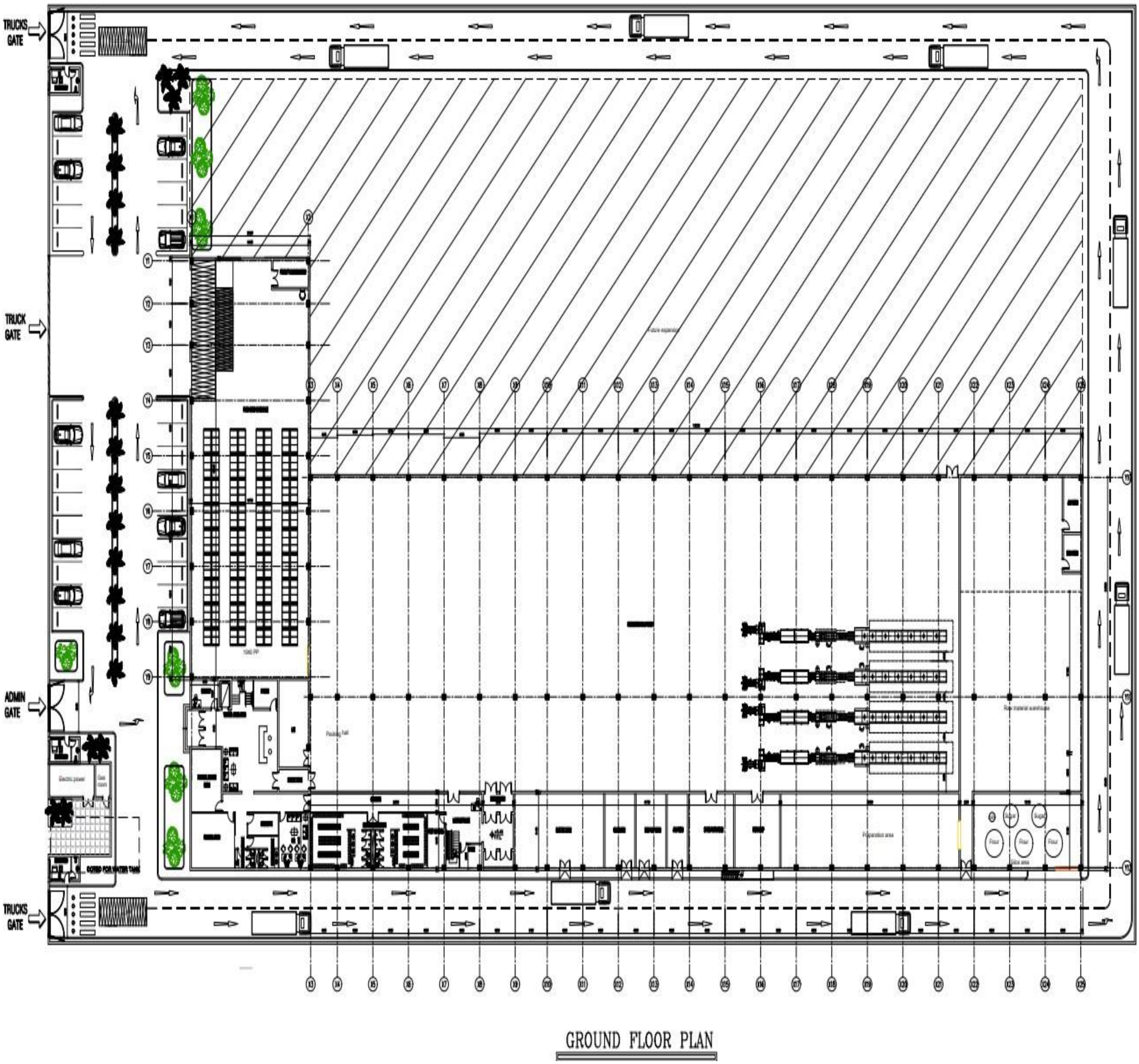
As a food industries factory there must be a plan for the process so that the production process goes smoothly, so that the layout of the project is planned to have clear path to the product, So the production hall design must satisfy the following objectives of the project.
So that we should start with the raw material hall (where the raw material is saved)
Then The production Hall (where the machines is)
Then the finished goods hall (where the Finished products are stored)

1.4.2.Truck flow:

The road is designed to have a clear path for the trucks.
The entrance of the trucks will be from gate in so the truck can easily be weighted and unload the raw material, then easily continue to gate out and leave the factory.

Project Layouts For Ground Floor:

The layout of ground floor shows the first stage of plant construction capacity, landscape, gates, truck flow and process floor



First Floor:

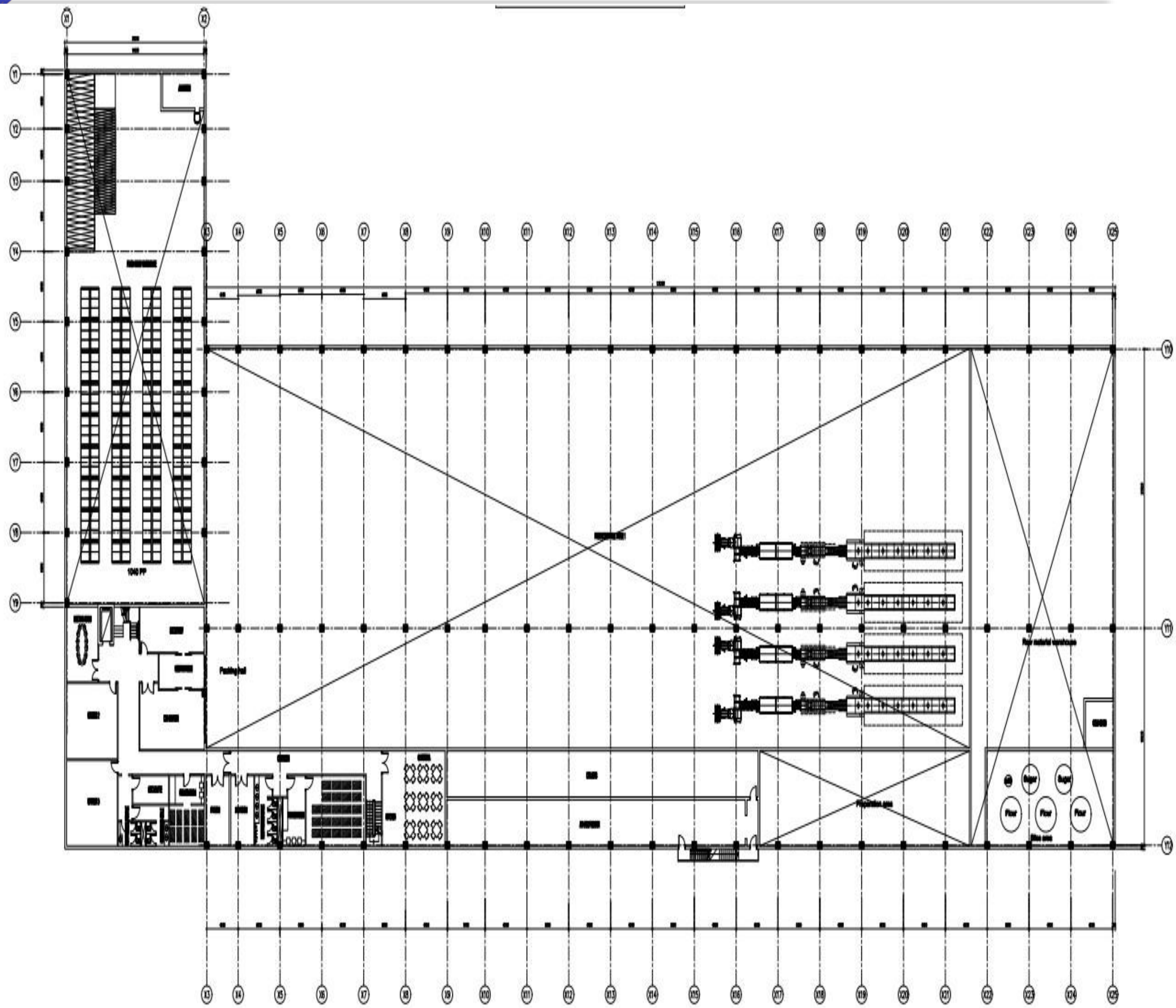
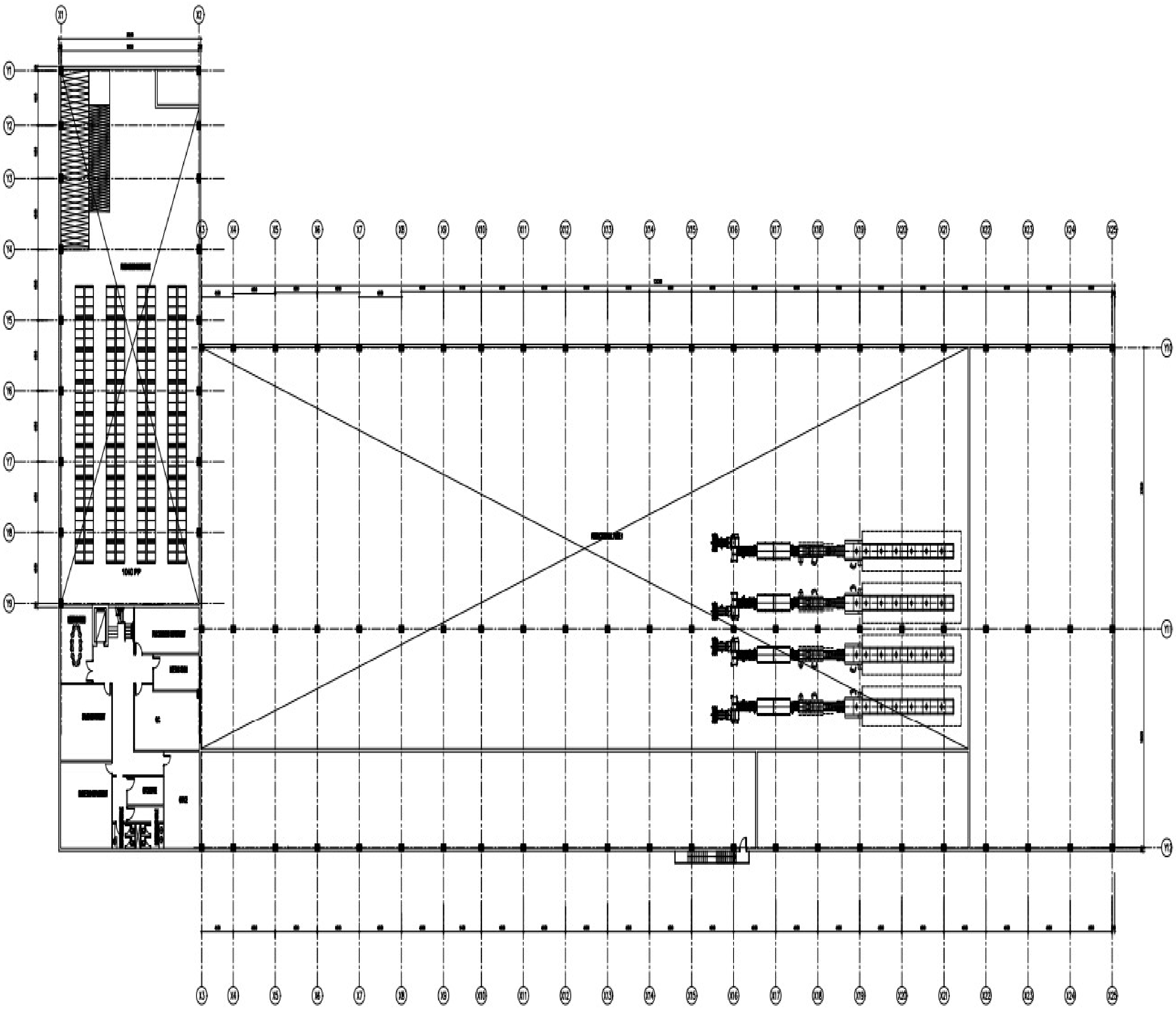


Figure 4 First Floor Layout

Second Floor:



SECOND FLOOR PLAN

1.5.-Project Duration:

Project Duration is 12 months.

- Temporary facilities play a vital role in creating a safe, efficient, and productive construction environment.
-

Milestone	Date	Items
Milestone-1	1st Dec, 2024	Indicated in the drawing + (gas room, electrical room, underground tanks)
Milestone-2	15th Jan., 2025	Goods Finish Area
Milestone-3	30th April. 2025	Indicated in the drawing + other works (guard room, fences, … etc.)

1.6.-Contract Analysis:

Contract Type: Lump Sum

Contract Value: 300,000,000

Project Duration: 12 Months

Start Date : April 2024

Finish Date : April 2025

Advanced Payment: 20% of contract accepted amount

Currency of Contract: EGP

Contract Documents Information:

· **Contract Language is English.**

· **The law is that in force in Egypt.**

· **The Ruling language is English.**

· **General conditions is FIDIC 1999 Red Book.**

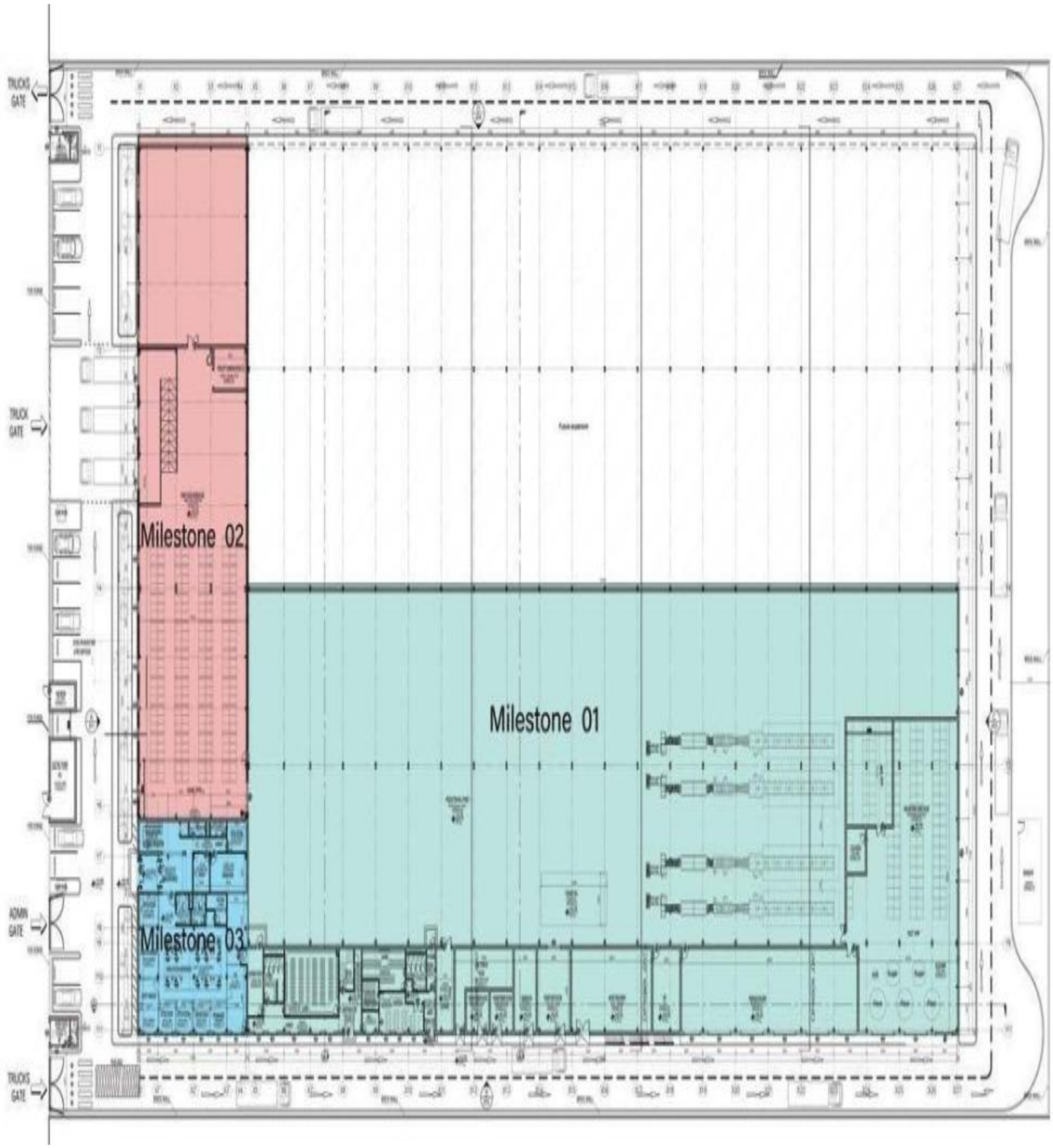
· **General conditions are amended and supplemented by Particular Conditions.**

Priority of contract documents heading any conflict:

(a) The Contract Agreement.
(b) The Letter of Acceptance.
(c) The Priced Letter of Tender.
(d) The Particular Conditions.
(e) The General Conditions.
(f) Any other document forming part of the Contract including the Contractor's Tender insofar as it is not covered by any of the foregoing.

1.7.-Appendix to Contract:

Amount of Delay damage	1.5% per week, as part of each milestone.
Limit of Delay damage	10% of the contract price
Defects liability period	12 Months
Percentage of retention	10% retention to be released after handling the project
Advanced payment	20% of the total contract.
Performance Security	10% of the contract price valid until the issuance of the defects liability certificate.


TRUCKS GATE
TRUCK GATE
ADMIN GATE
TRUCKS GATE
Milestone 02
Milestone 01
Milestone 03

1.8.-Funding Source:

Project is Private Sector funded by Employer/Owner Koning Food Industries.

1.9.-Location & Accessibility:

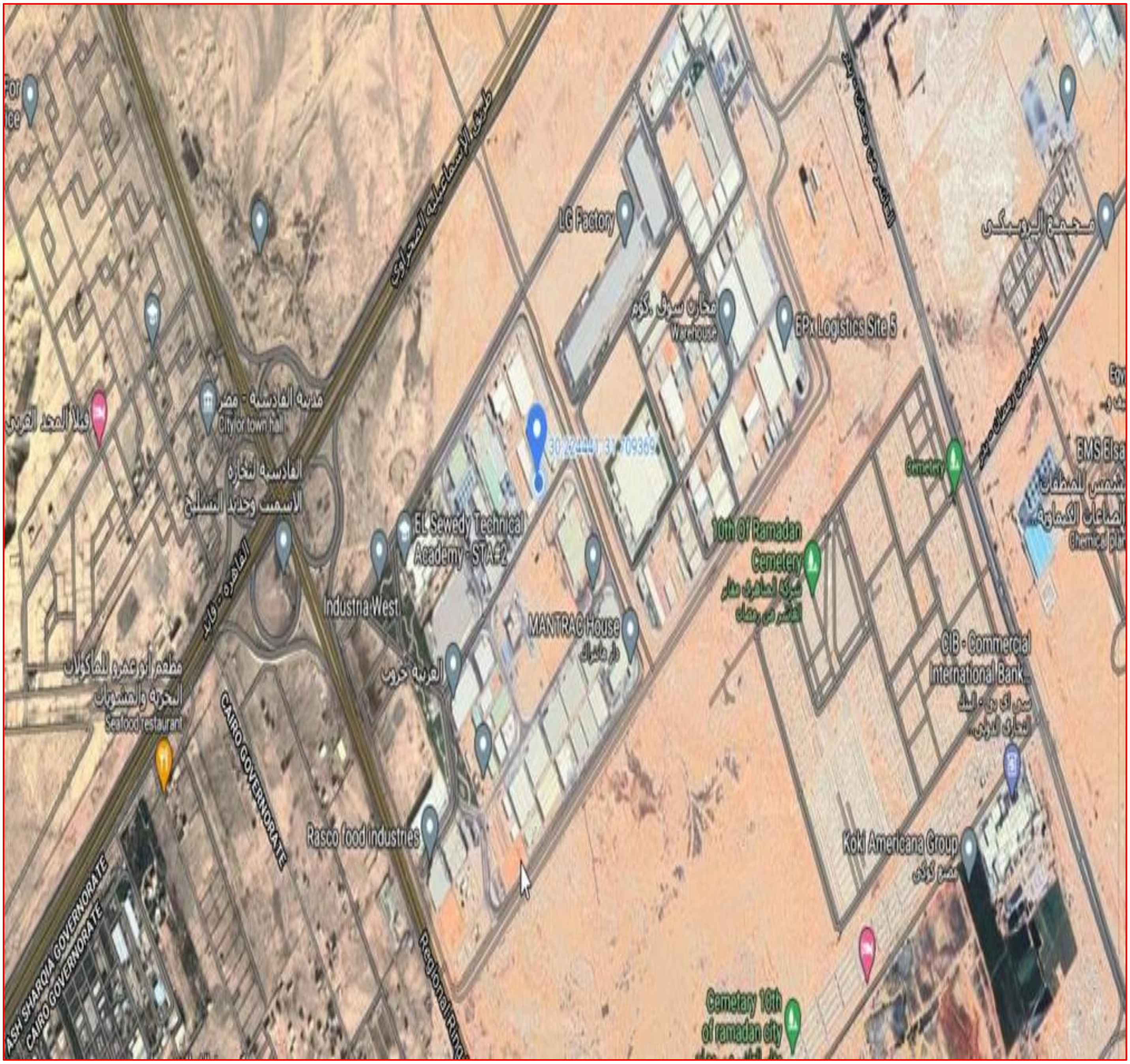
Location: is in Pyramids Industrial Park, 10th Ramadan City, Cairo, Egypt.

Access Routes:

Two major access roads:

1.9.1-10th Ramadan-Badr Rd. from Ismailia desert road then Al Tajamoaat Rd.

1.9.2- Al Tajamoaat Rd from Regional Ring Rd.



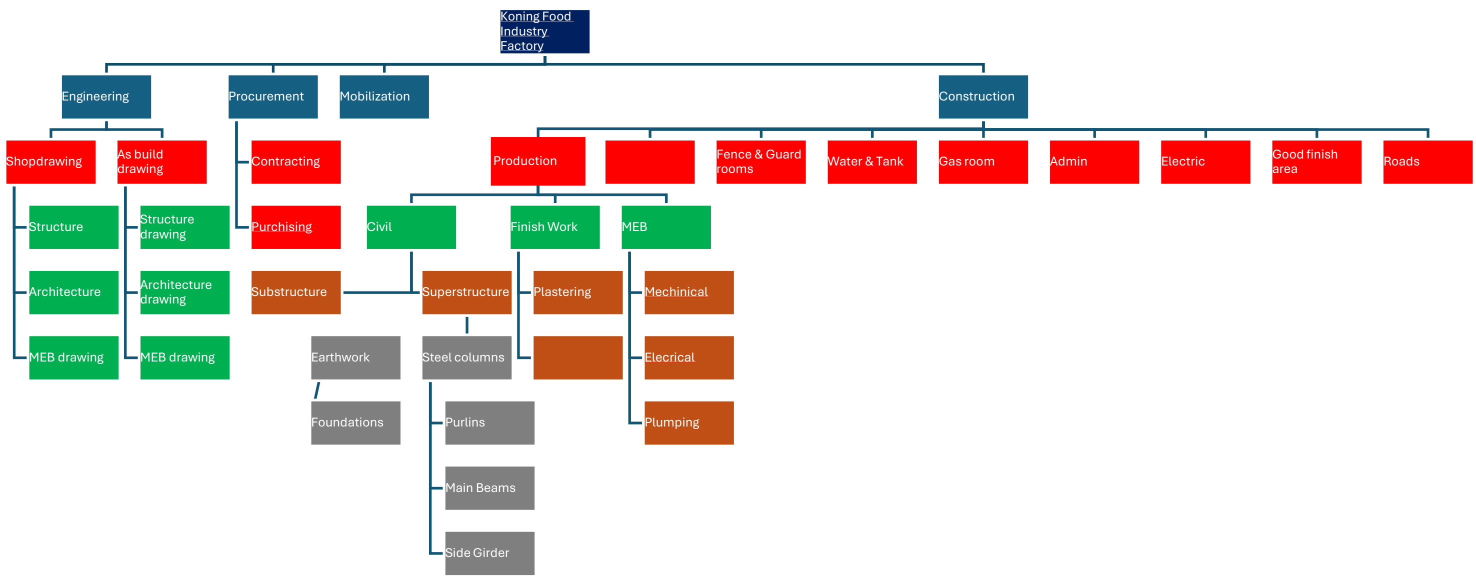
1.10-Project Stakeholders:

Project	Koning Food Industries – Factory
Location	Pyramids Industrial Park, 10th of Ramadan City, Cairo, Egypt.
Project Type	Private Sector Project
Owner	Koning Food Industries
project main consultant	Cosmos Engineering & Consultants
main contractor	Gama Construction
Civil work consultant	Cosmos Engineering & Consultants
MEP consultant	Cosmos Engineering & Consultants

1.11-Project Scope and Nature of Work:

This food factory is designed with distinct functional areas, comprising a production hall, a finished goods area, an administrative building, a staff building, and the essential external facilities and utilities required for seamless operation.

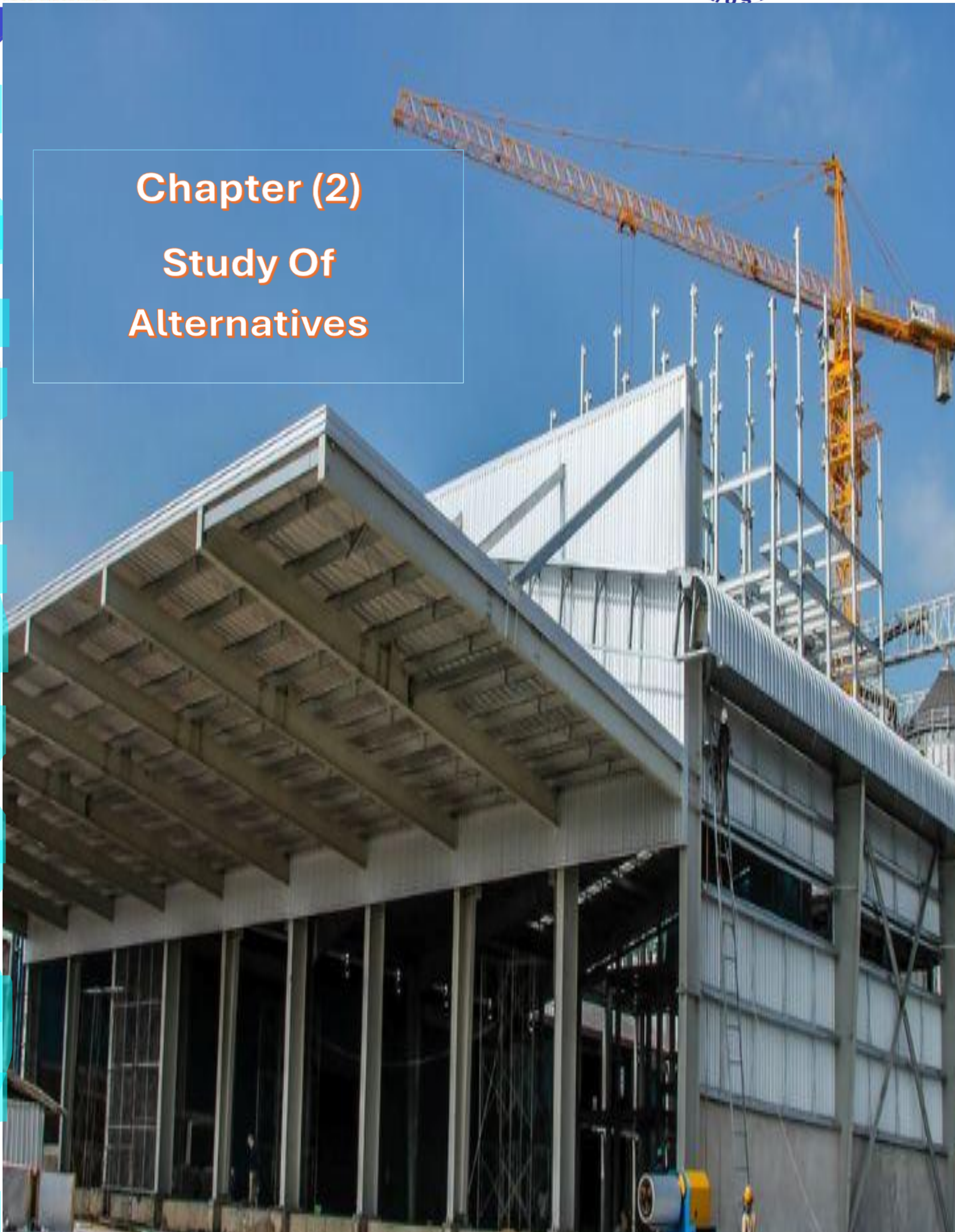
1.12-WBS:



Koning Food Industry Factory
Engineering
Procurement
Mobilization
Construction
Shopdrawing
As build drawing
Contracting
Production
Fence & Guard rooms
Water & Tank
Gas room
Admin
Electric
Good finish area
Roads
Structure
Structure drawing
Purchising
Civil
Finish Work
MEB
Architecture
Architecture drawing
Substructure
Superstructure
Plastering
Mechinical
MEB drawing
MEB drawing
Earthwork
Steel columns
Elecrical
Foundations
Purlins
Plumping
Main Beams
Side Girder

Chapter (2)

Study Of Alternatives



Chapter 2: Study Of Alternatives

2-1 Site layout

Construction site temporary facilities are essential for the smooth and safe operation of any construction project. They provide the necessary infrastructure and amenities for workers, management, and the overall project. Here's a breakdown of key aspects:

Key Categories of Temporary Facilities:

Site Offices and Administrative Facilities:

These include temporary office trailers or modular buildings for project managers, engineers, and administrative staff.

They serve as central command centers for planning, coordination, and documentation.

Worker Welfare Facilities:

Sanitation: Portable toilets, handwashing stations, and shower facilities are crucial for maintaining hygiene.

Break Areas: Designated areas with seating, shade, and access to drinking water are essential for worker rest and well-being.

Dining Facilities: In larger projects, on-site catering or dining areas may be provided.

Utilities:

Temporary Electrical Power: Essential for powering tools, lighting, and equipment.

Temporary Water Supply: Providing potable water for drinking and other site needs.

Waste Management: Systems for collecting and disposing of construction debris and general waste.

Security Facilities:

Fencing and Barriers: To secure the perimeter of the site and prevent unauthorized access.

Security Systems: CCTV cameras, alarms, access control systems for monitoring and deterring theft.

Lighting: Adequate lighting for night work and security.

First Aid and Safety Facilities:

First Aid Stations: Equipped with necessary medical supplies and staffed by trained personnel.

Emergency Evacuation Plans: Clearly defined procedures and routes for evacuating the site in case of emergencies.

Fire safety equipment.

Storage Facilities:

Storage containers or sheds for tools, equipment, and materials.

Important Considerations:

Regulations and Compliance: Temporary facilities must comply with local building codes, safety regulations, and environmental standards.

Safety: Ensuring the safety of workers and the public is paramount. Proper planning, installation, and maintenance of temporary facilities are crucial.

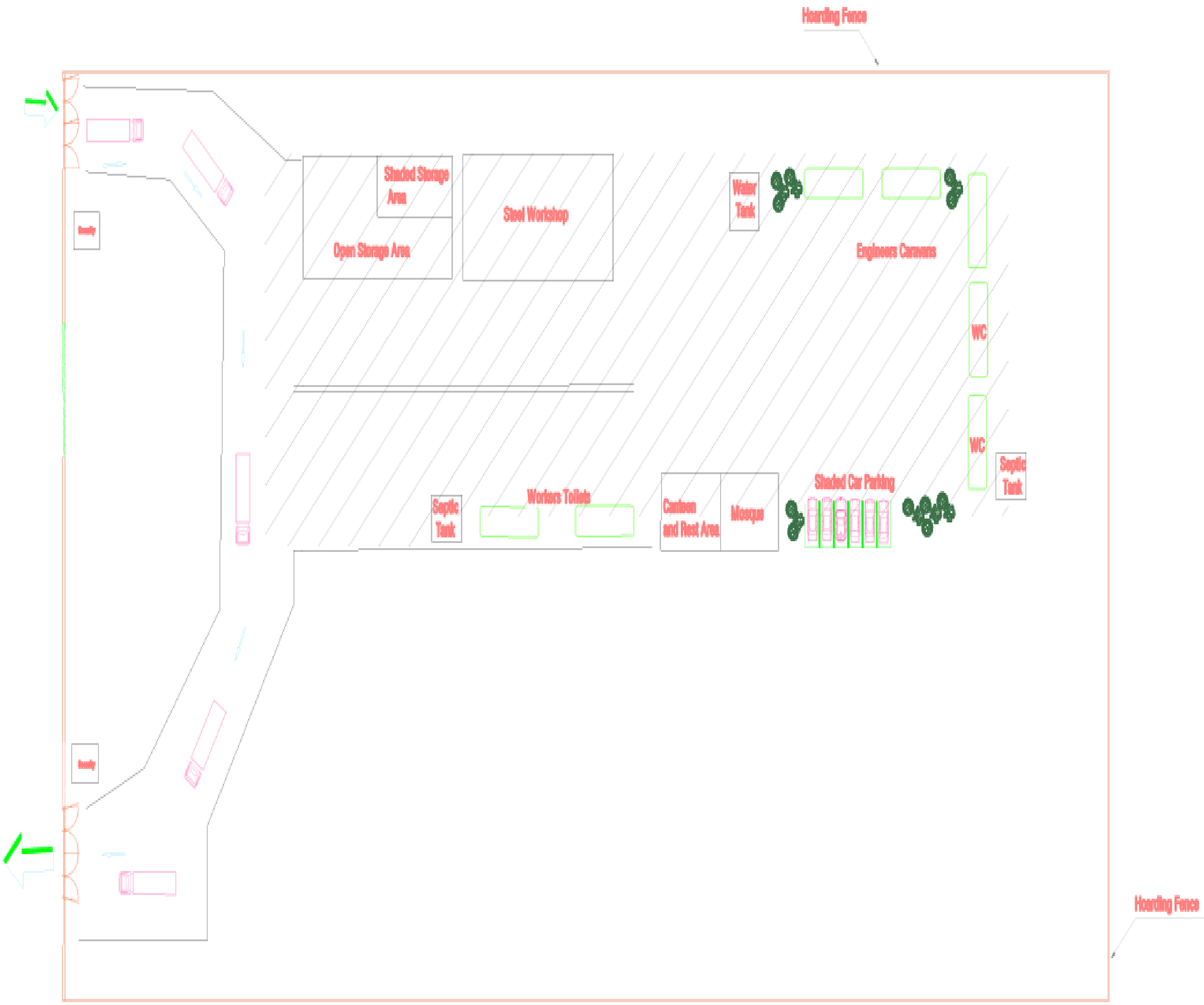
Sustainability: Increasingly, construction sites are adopting sustainable practices, such as using energy-efficient lighting, water conservation measures, and recycling programs.

Planning: Proper planning of the placement and type of temporary facilities is very important for site efficiency.

Temporary facilities play a vital role in creating a safe, efficient, and productive construction environment.

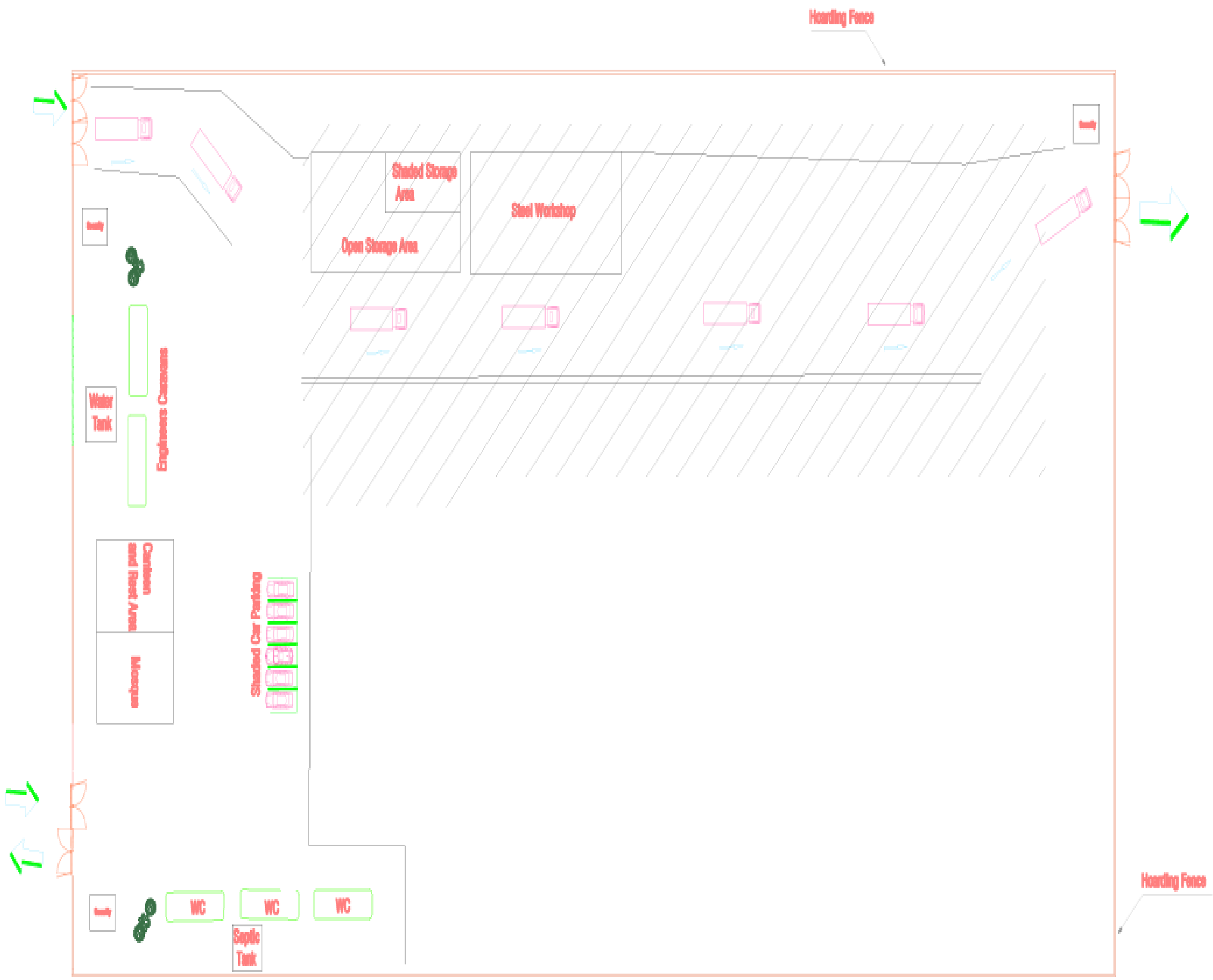
Milestone	Date	Items
Milestone-1	1st Dec, 2024	Indicated in the drawing + (gas room, electrical room, underground tanks)
Milestone-2	15th Jan., 2025	Goods Finish Area
Milestone-3	30th April. 2025	Indicated in the drawing + other works (guard room, fences, … etc.)


TRUCKS GATE
TRUCK GATE
ADMIN GATE
TRUCKS GATE
Milestone 02
Milestone 01
Milestone 03



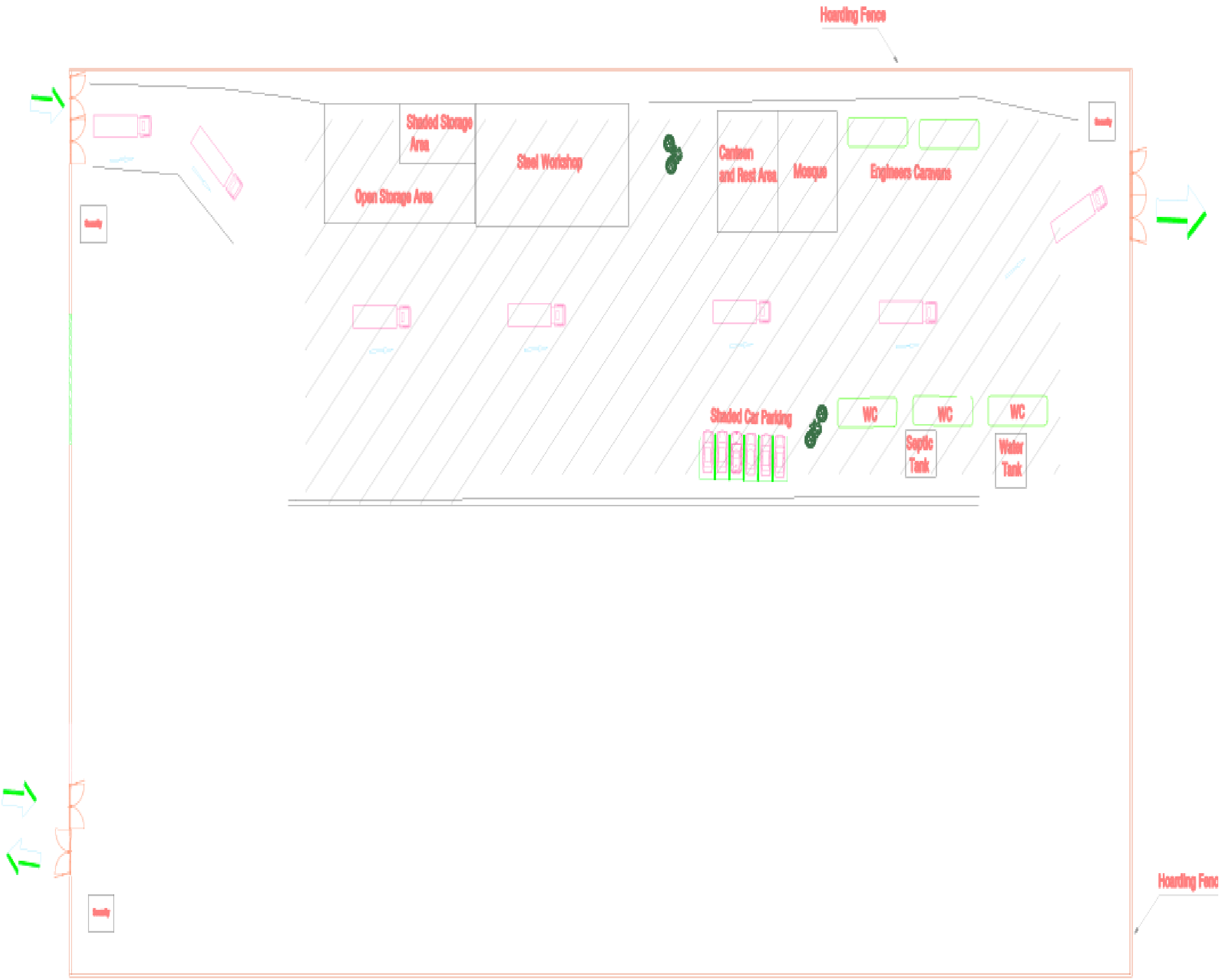
Site Layout - Option 1

Option1 less productivity rate and higher cost than option 3 .



Site Layout – Option 2

Option2 more safety but it has more cost than option 3.



Site Layout - Option 3

Option3 is the existing because it has higher productivity rate than option1 and less cost than Option2.

1 Criteria					
Criteria	Time	Safety	Cost	Score	Weights
Time	1	4.00	2	2.00	0.57
Safety	0.25	1	0.5	0.50	0.14
Cost	0.50	2	1	1.00	0.29
				3.50	1.00

2 Evaluation (1-5)			
	Time	Safety	Cost
Option 1	3	3	4
Option 2	1	4	1
Option 3	5	1	3

3			
Weights	0.57	0.14	0.29
Option 1	0.6	0.75	1
Option 2	0.2	1	0.25
Option 3	1	0.25	0.75

4 Final Score						
Option 1	0.34	0.11	0.29	=	0.74	
Option 2	0.11	0.14	0.07	=	0.33	
Option 3	0.57	0.04	0.21	=	0.82	better alternative

2-2 Formwork

• 2-2-1 Types of formwork : *Modular Formwork

1. Panel Formwork: Pre-fabricated panels made of steel, aluminum, or wood are used to create the formwork.

2. Modular Formwork Systems: Interlocking modules made of steel or aluminum are used to create the formwork.

* 2-2-2 Engineered Formwork :

1. Climbing Formwork: Formwork that can be raised or lowered as the concrete is poured, allowing for continuous construction.

2. Slip Formwork: Formwork that is continuously moved upward as the concrete is poured, allowing for continuous construction.

3. Tunnel Formwork: Formwork used for tunnel construction, typically made of steel or concrete.

* 2-2-3 Specialized Formwork :

1. Insulated Concrete Formwork (ICF): Formwork made of insulating material, such as foam blocks, that remain in place after concrete is poured.

2. Stay-In-Place Formwork: Formwork made of materials like steel or plastic that remain in place after concrete is poured.

3. Flexible Formwork: Formwork made of flexible materials, such as fabric or rubber, that can be used to create complex shapes.

* 2-2-4 Reusable Formwork :

1. Aluminum Formwork: Lightweight and reusable formwork made of aluminum.

2. Plastic Formwork: Reusable formwork made of plastic materials.

• 2-2-5 Here are some companies in Egypt that specialize in formwork:

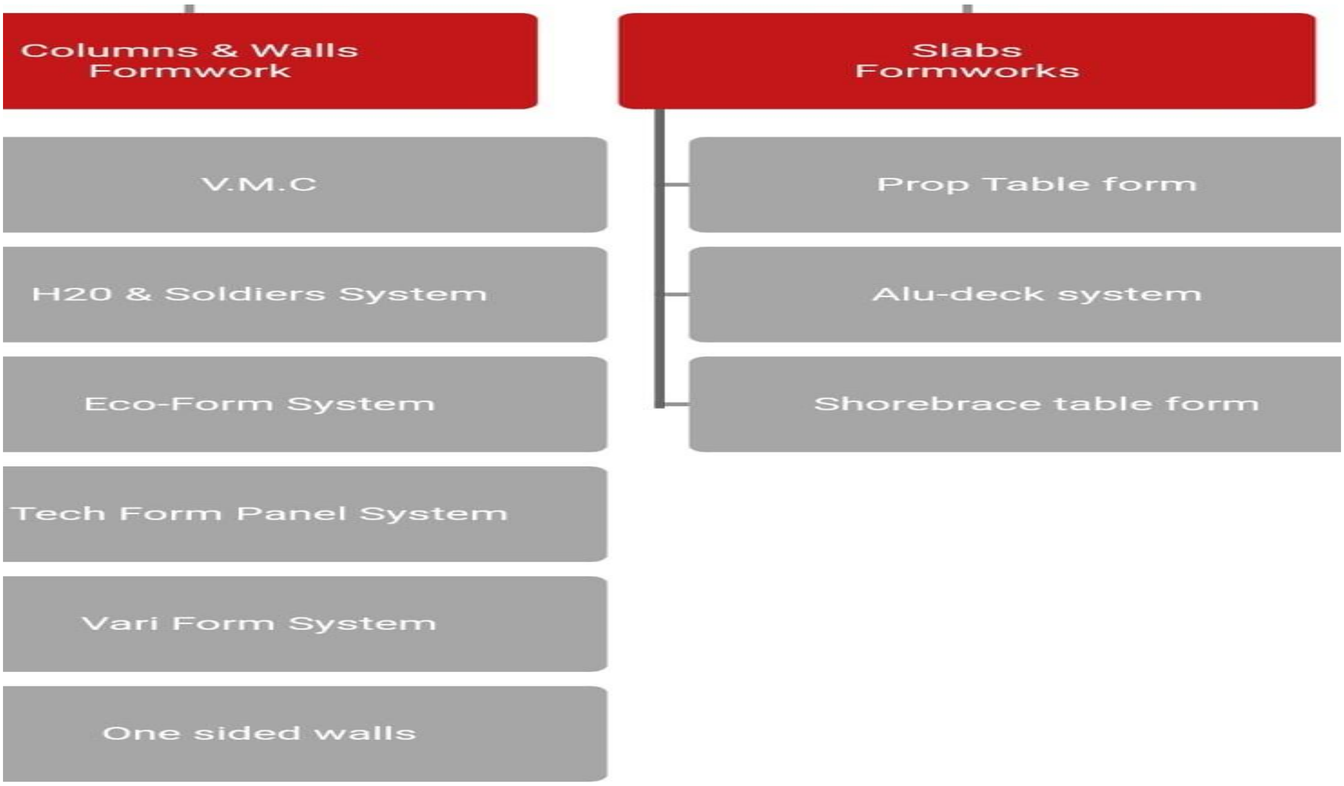
- PERI Egypt: A global company with a presence in Egypt, offering a range of formwork and scaffolding solutions. They provide engineering services, training, and on-site support to ensure successful project execution.

- Acrow Integrated Construction Services (AICS): A leading Egyptian company specializing in design, rental, and erection of formwork and scaffolding systems. They offer services like slip form, heavy lifting, and bridges repair.

- Shuttering Construction Company: An Egyptian company established in 1990, providing formwork services for various projects, including administrative buildings, hotels, educational institutes, and residential compounds. They **emphasize quality control, safety, and electro-mechanical coordination.**

- ULMA Construction: A global company with a presence in Egypt, offering formwork and scaffolding systems. They provide high-performance engineered products and reliable services.

The Used type of formwork in the project is the wooden formwork and will be rented from AICS .



The critires that used to choose wooden formwork : Time , Safety , Cost and Quailty.

• Wood Formwork (used option):

Wooden formworks are generally used for construction due to its ease of use. Different criteria for design of wooden formwork and their calculation is discussed.

Formwork is substantially significant temporary construction element in the construction of structures.

It provides necessary support until the concrete member achieves required strength and can support its own weight in addition to the imposed loads.

There are various materials for example steel, aluminum, fiber composite and wood from which formworks can be constructed. Manufacturers can produce steel, aluminum, and fiber composite formworks and can be utilized directly based on the information and specifications provided by the manufacturer.

However, wood formworks can be made in the construction site, but it needs to be designed properly.

There are different criteria that must be considered when wood formwork is designed.

In the following sections, different formwork design criteria will be discussed.

Pros & cons of wood option:

1-light in weight
2-easy to handle in the construction site
3-easy to cut the timber in various sizes as per requirement
4-easy to dismantle
5-Molds made of timber are not durable
6-Dry timber can absorb the water from the concrete thus weakening the structure.

Metal (alternative option):

It's a system of molds or forms, typically made from steel or aluminum, used to shape and support wet concrete until it hardens.

These forms are designed to be reusable, contributing to efficiency and

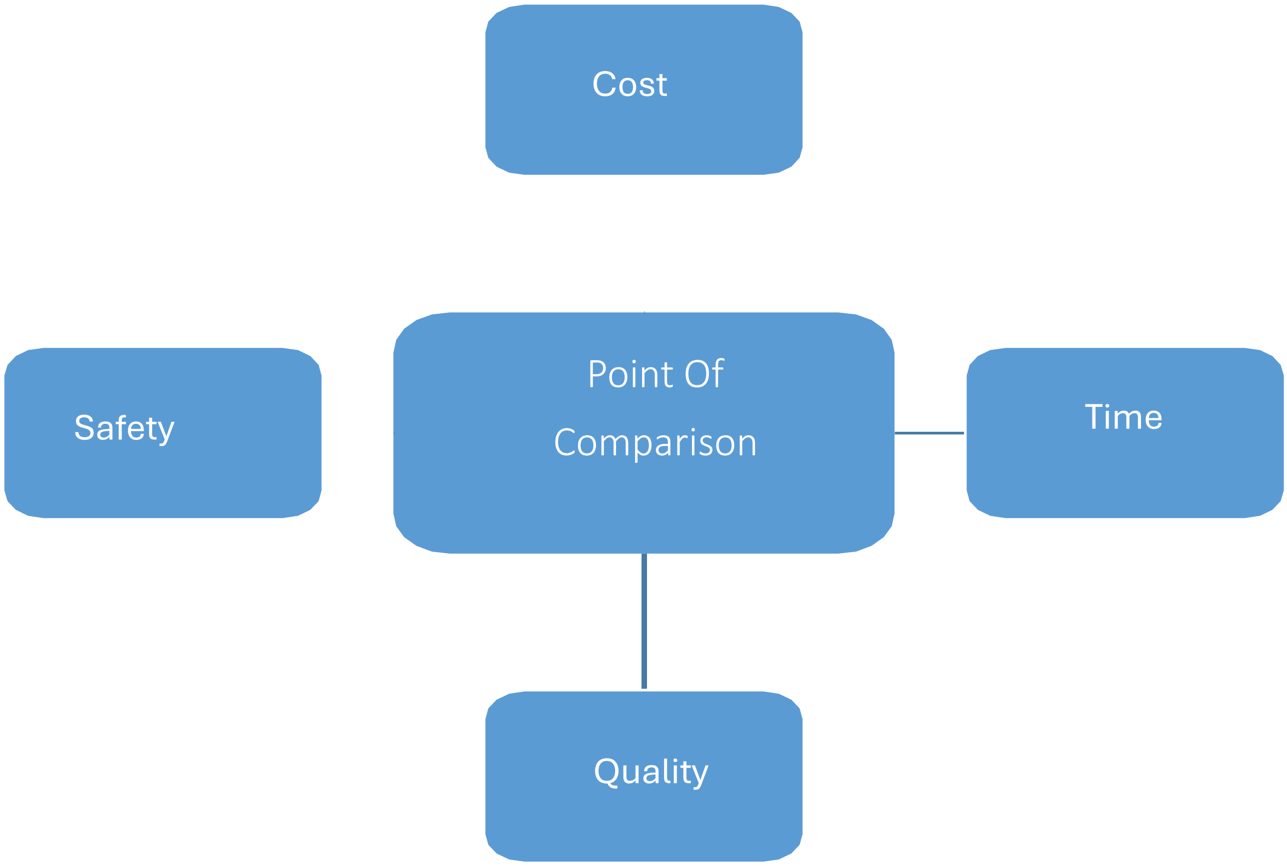
cost-effectiveness in construction projects.

Steel formwork features large steel plates secured togetherwith bars and couples known as false work.

Using steel is a good choice for builders because steel will notbend, warp, or otherwise become miss shaped during the concrete curing process.

Scoring Criteria:

Criteria	Scoring basics
Cost	• Initial cost • Manpower resources
Time	• Shuttering & Deshuttering .
Quality	• Deformation in concreteshape
Safety	• On site transportation • Shuttering & Deshuttering



1 Criteria						
Criteria	Time	Safety	Cost	Quality	Score	Weights
Time	1	4.00	2	2	2.00	0.45
Safety	0.25	1	0.5	1	0.59	0.13
Cost	0.50	2	1	1	1.00	0.23
Quality	0.50	1	1	1	0.84	0.19
					4.44	1.00

2 Evaluation (1-5)				
	Time	Safety	Cost	Quality
Wooden Formwor	4	2	4	3
Metal Formwork	2	4	2	5

3				
Weights	0.45	0.13	0.23	0.19
Wooden Formwor	1	0.5	1	0.6
Metal Formwork	0.5	1	0.5	1

4 Final Score							
Wooden Formwor	0.45	0.07	0.23	0.11	=	0.86	better alternative
Metal Formwork	0.23	0.13	0.11	0.19	=	0.66	

List of temporary facilities included in the project:

No	Facilities	Number	Size
1	Engineers caravans	2	3x9 m
2	Steel workshop	1	15x6 m
3	Shaded storage area	1	12x3 m
4	Open storage area	1	12x30 m
5	Canteen & Rest area	1	7x10 m
6	Shaded car parking	1	3x30 m
7	Mosque	1	3x3 m
8	Toilet	3	3x4 m
9	Security	3	3x3 m
10	Water tank	2	3x3 m

Tower Crane

2.3 Introduction

Study of alternatives in construction explores different strategies, materials, methods, and technologies to achieve the most efficient, cost-effective, and sustainable outcomes for a construction project. This type of study evaluates various options against criteria such as cost, time, durability, environmental impact, and compliance with regulations, aiming to identify the best approach for specific project objectives. Here's an outline of how such a study might be structured and we compare different methods to get the appropriate solution.

Tower Crane

Tower cranes are essential pieces of equipment in modern construction, particularly for high-rise buildings. They are designed to lift and move heavy materials efficiently.

As Our Project Consists of Steel Structure, Crane is a very essential equipment for our work.

But we have to choose between Fixed Tower Crane or Mobile Cranes.

Tower crane foundation design is a specialized engineering discipline.

Accurate site investigations and careful calculations are essential.

Safety is paramount in all aspects of tower crane foundation design and construction.

Here's a suggestion if we are using an 80-meter-long arm tower crane for our site,

to have the ability to reach storage area and every point of our 180m Long Site:

And here's a study using AHP to decide which alternative to be used:

1 Criteria						
Criteria	Time	Safety	Cost	Risk	Score	Weights
Time	1	0.50	1	2	1.00	0.23
Safety	2	1	3	2	1.86	0.42
Cost	1.00	0.33333333	1	4	1.07	0.24
Risk	0.50	0.5	0.25	1	0.50	0.11
					4.44	1.00

2 Evaluation (1-5)				
	Time	Safety	Cost	Risk
Fixed Tower Crane	4	4	1	1
Mobile Cranes	3	2	5	4

3				
Weights	0.23	0.42	0.24	0.11
Fixed Tower Crane	1	1	0.2	0.25
Mobile Cranes	0.75	0.5	1	1

4 Final Score							
Fixed Tower Crane	0.23	0.42	0.05	0.03	=	0.722	
Mobile Cranes	0.17	0.21	0.24	0.11	=	0.734	better alternative

As Tower Cranes has higher cost of fixation, Installation, Operation and Daily Rates, it also has a very higher risk of being unused for a while if not needed, which will result a lot of costs, Mobile Cranes are preferable and best alternative for our case.

2.4 Batch Plant

Concrete Batch Plant On Site vs Ready Mix Concrete from Nearby Plants.

Having a concrete batch plant on-site can significantly impact a construction project. Here's a breakdown of the advantages and disadvantages:

Advantages:

- **Increased Control Over Concrete Quality:**
  - On-site plants allow for precise control over the concrete mix, ensuring it meets specific project requirements.
  - Freshness of concrete is maximized, which is crucial for certain applications.
- **Reduced Transportation Costs and Delays:**
  - Eliminates the need to transport concrete from off-site locations, reducing transportation costs and potential delays due to traffic or long distances.
  - This is especially beneficial for large-scale projects or remote locations.
- **Improved Project Scheduling and Flexibility:**
  - On-site plants provide greater flexibility in scheduling concrete pours, allowing for adjustments based on project needs.
  - Reduces reliance on external suppliers and their delivery schedules.
- **Reduced Waste:**
  - Producing concrete on demand minimizes waste compared to ordering excess from off-site suppliers.
- **Suitability for large scale projects:**
  - For very large projects, the sheer quantity of concrete needed makes on site batch plants very efficient.

Disadvantages:

- **High Initial Investment:**
    - Setting up an on-site batch plant requires a significant initial investment in equipment, installation, and site preparation.
- **Space Requirements:**
    - Batch plants require a considerable amount of space for storage of raw materials, mixing equipment, and operating areas.
- **Environmental Concerns:**
    - Concrete production can generate dust, noise, and wastewater, requiring proper mitigation measures.
    - Permitting and compliance with environmental regulations can be complex.
- **Maintenance and Operational Costs:**
    - Batch plants require regular maintenance and skilled operators, adding to operational costs.
- **Liability:**
    - The company running the batch plant takes on the liability of the quality of the concrete produced.
- **Material storage:**
    - Large quantities of raw materials must be stored on site.

Key Considerations:

- The size and duration of the project.
- The availability of space and resources.
- Environmental regulations and permitting requirements.

In essence, on-site concrete batch plants offer significant advantages in terms of control and efficiency, but they also require careful planning and management to address the associated costs and challenges.

1 Criteria						
Criteria	Time	Quality	Cost	Risk	Score	Weights
Time	1	2	1	3	1.57	0.34
Quality	0.5	1	0.5	2	0.84	0.18
Cost	1	2	1	5	1.78	0.39
Risk	0.33	0.5	0.2	1	0.43	0.09
					4.61	1.00

2 Evaluation (1-5)				
	Time	Quality	Cost	Risk
Batch Plant On Site	5	5	1	5
Ready Mix Concrete from Nearbay Plants	3	3	5	3

3				
Weights	0.34	0.18	0.39	0.09
Batch Plant On Site	1	1	0.2	1.00
Ready Mix Concrete from Nearbay Plants	0.6	0.6	1	0.6

4 Final Score							
Batch Plant On Site	0.34	0.18	0.08	0.09	=	0.692	
Ready Mix Concrete from Nearbay Plants	0.20	0.11	0.39	0.06	=	0.754	better alternative

***Given our specific site conditions and project requirements, it's clear that utilizing ready-mix concrete from nearby plants is the most practical and efficient solution. Here's a breakdown of why:**

- **Proximity to Ready-Mix Plants:**
  - The fact that your site is "not far" from multiple ready-mix concrete batch plants is a significant advantage. This minimizes transportation time and costs, ensuring a consistent supply of fresh concrete.
- **Small Concrete Quantity:**
  - For projects requiring a small quantity of concrete, setting up an on-site batch plant is often not cost-effective. The initial investment and operational costs would likely outweigh the benefits.
- **Steel Structure Buildings:**
  - While steel structure buildings do require concrete foundations, the overall concrete volume is typically lower compared to reinforced concrete structures. This reinforces the argument for using ready-mix concrete.
- **Limited Space Availability:**
  - The lack of available space for a batch plant and material storage areas is a critical factor. On-site batch plants require a significant footprint, and without adequate space, it's simply not feasible.

In summary:

- Utilizing ready-mix concrete eliminates the need for on-site equipment, storage, and personnel.
- It reduces overall project costs.

Therefore, relying on the readily available ready-mix concrete plants in your vicinity is the most logical and efficient approach for your project.

Chapter (3)

Method statement

Chapter 3- Method statement

Foundation

As our Project is mainly a steel structure, its foundations consist of RC Footings and RC Pedestals with planted Anchor Bolts for steel columns fixation.

We will discuss method statement of Formwork, Steel Reinforcement, and Placing Concrete for Pedestals.

3.1 EXCAVATION AND BACKFILLING

scope

This method statement details the activities required for excavation, filling and compaction work to be done in the project, taking into account that the activities will be carried out during daylight.

3.1.1Team Members and Responsibilities:

- Project Manager: overall responsibility
- Consultant
- Construction Supervisor: Responsible for site works and reports to Construction Manager.
- Civil Supervisors: Report to Civil Engineer.
- Foreman: Reports to Construction Supervisor.
- Operator: Responsible for the excavator and loader.
- QC Civil Inspector: Reporting to QA Manager
- Driver Responsible to haul and Dump the Surplus.
- Safety manager: make sure that work is happening according to the safety plane**.**

3.1.2Equipment for Excavation

- Loader
- Excavator CAT 320
- Dump Truck
- Water Truck

3.1.3Equipment & Tools for Filling and Compaction Works

- Wheel Loader
- Excavator CAT 320
- Dump Truck
- Roller/ plate compactor
- Wheel Loader
- Water Truck

3.1.4Manpower for Excavation

- Engineer
- Forman
- Surveyor
- Assistant Surveyor
- Excavator CAT 320 Operator
- Dump Truck Drivers
- Wheel Loader Operator
- Water Truck Driver

3.1.5Manpower for Filling and Compaction Works

- Engineer
- Forman
- Surveyor
- Assistant Surveyor
- Excavator CAT 320 Operator
- Dump Truck Driver
- Roller / Plate Compactor Operator
- Wheel Loader Operator
- Water Truck Driver
- Labor

3.2Materials

- Fill material shall conform to Project Specifications.

3.2.1Methodology of Excavation

The surveyor will mark the limits of excavation and will provide reference points for levels at all the suitable locations based on the approved drawings.

Structural & section excavation shall start after cleaning and grubbing and shall include excavations for pits, manholes, catch basins, pipe lines as indicated on Approved Design Drawing.

Maximum depth of excavation shall be as specified in IFC DWG's.

Depending on soil properties, precautions to be considered to ensure the slope stability.

The excavation will be done using Loader or Excavator, depending on the space availability. The slope will be determined depending on the soil conditions.

The loader and dump trucks will be used for hauling, levelling and carrying the excavated material.

3.2.2FILLING AND COMPACTION

Laboratory Testing of Fill Material

The tests should be performed as per project specifications.

Particle size analysis of soils -ASTM D422

Modified Proctor test as per ASTM D1557

Field Dry Density- ASTM 1556 (Sand cone method)

Liquid limit, plasticity index

3.2.3Methodology for Filling and Compaction

Prior to starting the backfilling procedure, a survey control has to be done. Surveyors will mark filling limits by driving steel rods in the ground at different locations. Level marks with reference to the established benchmarks at the site will be indicated on the steel rods using red tapes. These level marks will guide the operator to fill and compact the material in the required thickness.

The sub-grade will be prepared prior to placing fill material by removing ruts, debris hummocks and other objectionable organic matter. Then, the sub-grade will be compacted as per project specifications.

The approved fill will be hauled to the filling area by trucks and dumped to the designated area.

Suitable fill material is hauled to place either from stockpiled material or directly from areas being excavated on another part of the site. If suitable fill material is found in the vicinity, material could be tipped and spread as required.

Material will be spread to an un-compacted thickness according to the project specifications by loader and shovel. Final grading will be done by labor. Spraying water will compensate loss of moisture during hauling and spreading operation. Each layer will be compacted according to the project specification, using a vibratory compactor. Filling, spreading and compacting will progress in layers until the required final level is achieved. The layer thickness shall be as per project specifications or as mentioned in IFC drawings For pipe lines bedding, clean sand shall be used and compacted to the required slopes & levels. After pipes installation, backfilling using clean sand shall be performed to the height specified on drawings; normal backfill material shall be placed & compacted above the sand in layers till the final grading is reached.

3.3 Formworks

scope

The scope of this method statement is to describe in detail the design principles and the usage of the form work forecast in situ activities.

This method statement is guided by the provisions of technical specs. for civil works.

Resources

a. equipment for timber formwork

- portable tools

b. Manpower for timber formwork

- Carpenters
- Carpenters helpers
- Labor

c. Materials for timber formwork

- timber
- plywood
- Release Agent

3.3.1 Execution Methodology

Exposed formwork shall be with plywood, U/G concrete against soil shall be with rough face from work, steel scaffolding shall be used when required, no timber scaffolding shall be used.

3.3.2 Formwork design

Both types of formwork shall be designed to meet the following requirements:

The structure dimensions indicated in the construction drawings

Stability of the formwork (both vertically and laterally) in the initial position during or after concerting.

The surface finish can be as per the required type. The formwork shall allow proper concrete placement and vibration. The formwork shall be well tight to prevent mortar loss.

The formwork shall withstand the pressure of the fresh concrete and dead & live loads as well as re-shoring loads in multi stories structures.

The form shall support solidly and in accurate positions, all the embedded items placed as per construction drawings.

Ties

Ties will be placed at such intervals that will not allow any movement or deformation of the formwork beyond the specified tolerance limits. Forms for small section elements, i.e., columns, shall be tied externally.

Through-ties shall be used for big area forms.

Coating

Prior to concreting, the form shall be cleaned and any foreign material shall be removed.

If necessary, openings shall be provided in the formwork for the removal of the foreign materials. Before placing the formwork, it will be coated with the approved release agent. The properties and coating procedure shall conform to project specifications.

Removal of Forms and Shoring

Formwork for columns, sides of beams, walls (except for tank foundations) and other formworks not supporting the concrete weight shall be removed as per the Egyptian code

Shoring and Propping

Al shoring and propping requirements shall be submitted to client for approval.

Chamfers

All exterior exposed corners shall be chamfered as indicated in the construction drawings.

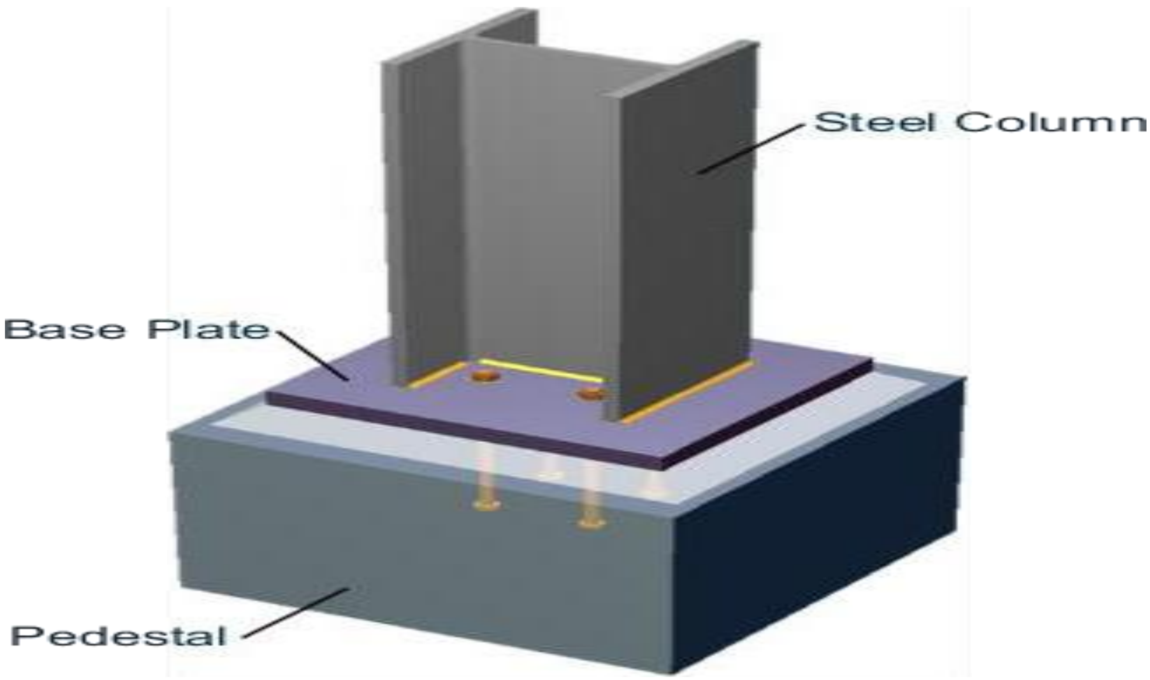
Concrete Surface Finish

The materials we intent to use for the formwork skin shall produce a fair face class finish as per the project specifications.

3.4 Pedestals

scope

Concrete pedestals are used under the steel columns, since A concrete pedestal is a compressionelement provided to carry the loads from supported elements like columns. With the Pedestals there are very little chances of contact between the column section and the subsoilearth.



3.4.1 Method of construction

- At first, the Dimensions of the pedestals are
  - Length: 0.5 m
  - Width: 0.4 m
  - Height: 1.85 m

- then followed by an amount of reinforcement which is to be provided in a pedestal, to safely transfer the loads from column to the footing.
- After placing the reinforcement cage, the shuttering of the formworks is fixed. adding the dimension of reinforcement placed with adequate cover (40mm most of the case).

- After the shuttering is fixed, the final phase begins which is concreting.
- The concrete is manufactured from the rotating drum mixer.
- Because of the big height of the pedestals, it would be a risk of having errors in the location of plates, and since we need to have an accuracy of millimeters, then, Concreting will be in two phases.
-
- After placing the first phase of concrete, plates and anchor bolts would be fixed.
- Then the second phase of concreting.
-
- After the concreting finishes, it is then left for 24-48 hours for the concrete to complete set.

Now the pedestals are ready for insulation by liquid bitumen

3.5 Reinforcement Steel reinforcement

scope

this method statement describes the procedure to be followed for fabrication and placing of steel reinforcement

specification references

Egyptian code of practice as well as engineer instructions and approvedworkshop drawings

Resources

a. Manpower

- Steel fixers
- labor

b. Materials

The steel reinforcement will consist of high tensile deformed bars, complying with the requirements of technical specification for civil works

Methodology of Reinforcement

Cutting and bending bars

The reinforcement will be cut and bent in accordance with the approvedbar bending schedules.

The bending of the reinforcements will be done by steel mandrels on thebending machine, producing a gradual and even motion.

Bars will be bent cold and at specified radii according to standers

Receipt and storage of bars

The rebar received from the supplier will be inspected.All defective materials will be replaced by the supplier.

The storage of rebar will be arranged above ground on padded supports,using timber pieces or sands bags.

The rebar will be covered with dark light proof material to prevent fromrust caused by environmental conditions.

Placing of reinforcement

Minimum concrete cover for reinforcement shall be as reinforced concrete works general notes.

All reinforcement shall be supported and fastened before concrete isplaced and shall be secured against displacement within permitted tolerance.

Reinforcement supported by formwork shall rest on bar supports made of plastic or other acceptable material.

Reinforcing bar supported from the ground, mud mat or formwork shallrest on concrete supports, or on plastic supports or other acceptable material.

All splices will be provided as indicated in the approved for constructiondrawings.

Bending or straightening of bars partially embedded in concrete will not bepermitted without prior approval of the client.

RFI will be issued in accordance to site inspection procedure.

The reinforcement at obstructions or where it clashes with another reinforcement will not be cut, bent, omitted or modified without priorapproval from the client.

The welding of reinforcement will not be permitted.

Fixing of reinforcement

The handling reinforcement from the storage area to the place of fixing wilbe done carefully.

Prepared lengths of the bars will not be dropped.

Mechanical damage by tools, heavy footwear and wheel borrows will beavoided.

The reinforcement will then be accurately fixed in the required positions.

The bars intended to be on contact at passing points will be securely tied together at all such points with steel tying wires. After fixing, the reinforcement will be inspected for type, size and accuracyof placing.

The reinforcement projecting out from work being concreted or alreadyconcreted will not be bent out of its correct position.

It will be protected from deformations or any other damages.

The cover to reinforcement will be maintained by using either plasticspacers or concrete blocks.

Cantilever and top bars over supports will be held in correct positions during concreting with the help of rebar chairs placed between top andbottom bars and approved spacers below the bottom bars.

Resources

a.Equipment

- portable tools

b.Manpower

- Carpenters
- Carpenters helpers
- Labor
- Steel fixers

c.Materials

- timber
- weather proof plywood
- accessories
- release agent

The steel reinforcement will consist of high tensile deformed bars

Safety

- All works shall comply with safety procedure or instruction set out in project safety plan andmunicipality rules and regulations.

- Basic PPE to be worn by all staff and laborers.

- Trained operator and banksman would be engaged to control or operate heavy equipmentmachine.
- Provide sufficient lighting whenever night casting.

3.6 Slab on Grade – SOG

Scope

This method statement covers general outline procedures to be carried out for slab on grade activities as per civil and arrangement specifications.

Responsibilities

- Contractor's project manager and his team are responsible for ensuringthat the method statement is fully implemented.

- Any amendments to this method statement during work execution must be approved before implementation.

Objective

This method statement is to ensure the work will be expedited in an efficient and safe manner in accordance with all relevant contract documents, specifications and drawings.

Sequencing

1. Surface preparation top of backfilling cleaning with goodlevelling.
2. Spraying Anti-termite.
3. Placing of polyethylene sheets.
4. Plain concrete pouring.
5. Water proof layer as per BOQ andspecs.
6. Screed.
7. Installation of mesh reinforcement and concrete spacer.
8. Make sure for all other activities (box-outs, imbedded items, MEP works, formwork)
9. Reinforced concrete pouring.

Materials

1. Polyethylene sheets.
2. Steel reinforcement.
3. Concrete spacer.
4. Timber.
5. Iron wire.
6. Filler.
7. Water proof sheets.

Equipment

1. Grinder cutter.
2. Wood float.
3. Hammer.
4. Aluminum tube.
5. Hand tools
6. Manual shovel.
7. Air compressors.
8. Concrete pump.
9. Survey instruments.

Quality Assurance (QA)

- Clean the area of any loose materials prior to start any work, make sure that the compacted fill to received concrete is approved by the consultant engineer.

- Check the dimensions from the approved shop drawings.

- Place the vapour barrier - Polyethylene sheets with the longest dimensionparallel with the direction of concrete.

- Plain concrete as per approved shop drawings.

- Install mess reinforcement as per approved shop drawings.

Quality Control (QC)

Concrete Testing:

- Tests should be done on all the concrete received in site; tests resultsshould be submitted to contractor after 28 days for approval.

- The number of failed tests (tests where the compressive strength less than maximum compressive strength) should not exceed 5% of the number of tests.

Testing on Fresh Concrete:

Slump test

The concrete slump test is an empirical test that measures the workability of fresh concrete. More specifically, it measures the consistency of the concrete in that specific batch.

It is also used to determine consistency between individual batches. it should be done with every strength samples **Acceptance limits:**

10 mm for slump < 50 mm 20mm for slump 50-100mm 30mm for slump> 100 m

Flow test

The flow table test or flow test is a method to determine the consistency of fresh concrete. It should be applied when fresh concrete is delivered to a site by a truck mixer.

This test is used to determine the consistency of the ready-mix concrete before pouring it into formwork. Any segregated concrete or any defective concrete shall be rejected

Testing on hardened concrete

Compressive strength tests

6 cubes with dimension 15*15*30 cm from the first 50 m3 and 6 cubes for every additional 100 m3, half specimens to be tested at 7 days and the other half at 28 days.

It should be done for every concrete grade, every element & every day of pouring. The test is accepted if the average of 6 cubes after 28 days greater than the maximum compressive strength of the concrete.

Testing on reinforcement rebar

Cold bend test

This test provides visual inspection of cracking in the steel bars, by bending it at normal temperature to see whether the percentage of cracking is acceptable or not.

3.7Steel Erection & Lifting

Scope

The purpose of this method statement is to establish a work sequence on how erection and installation of steel works will be implemented safely and in accordance with the contract requirements.

Responsibilities

- Contractor's Project director / Manager and his team and their designee's subcontractors are responsible for ensuring that this Method Statement is fully implemented. Any amendments to this Method Statement during work execution must beapproved before implementation.
- A record of any such changes is to be kept and incorporated in the final As-Built report or drawings for future reference.

Equipment

The following equipment is involved:

- Mobile crane.
- Welding machine.
- Boom Truck.
- Forklift.
- Ladders.
- Man lift.
- Wires.
- Scaffolding.
- Hand tools.
- Finishing tools.

•

Materials

- Anchor Bolts.
- Steel Sections fabricated in workshops according to shop drawings andspecifications.
- Welding.
- Bolts and nuts.

Erection Steps

Anchor bolts

- Install the anchors in the concrete base using dummy plate with thickness 3mm (have the same dimension of column base plate), as shown in fig(41)
- Total station device should be used to set the positions of the plates (3point for each plate).
- Remove the dummy plate after the concrete casting; Check the anchorsposition again after the casting and make as built drawing.

Installation the area between axes

Installation will be done using 1 mobile cranes

Installation of Frames will be in the following sequence:

1) Columns
2) Side Beams
3) Main Beams / Girders
4) Roof Purlins
5) Tie Rods

- Alignment and Verticality of columns should be checked.
- Tightening of all bolts.

- Alignment and Verticality of columns should be checked again after bolts tightening.

Step1

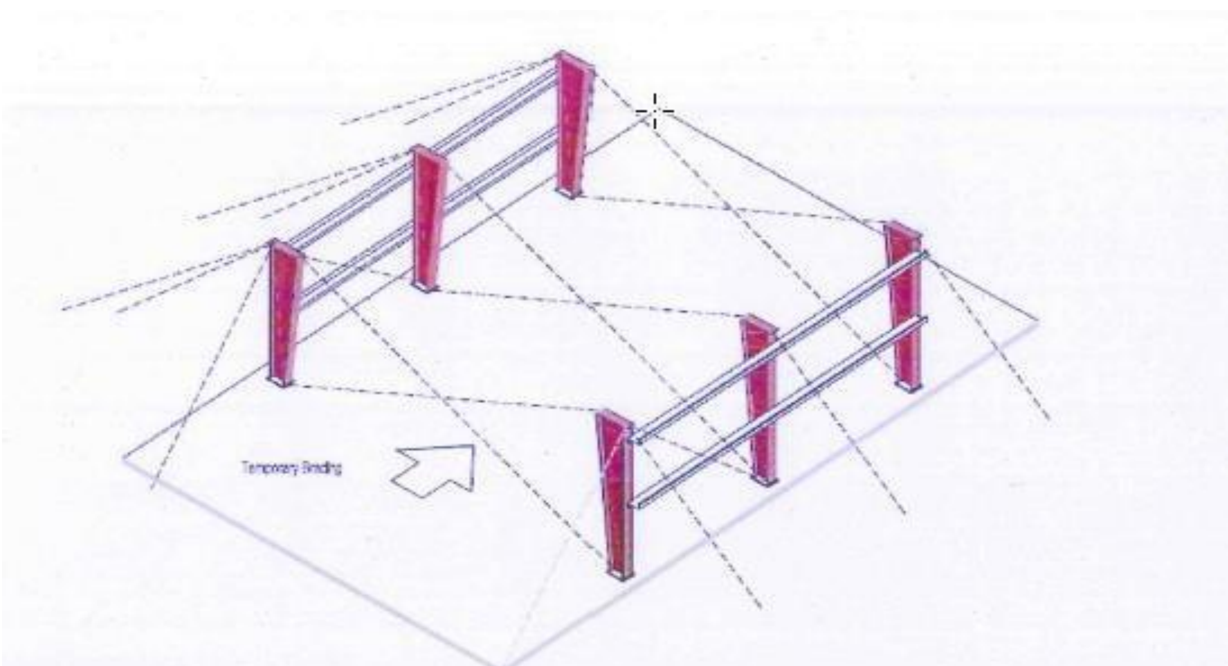
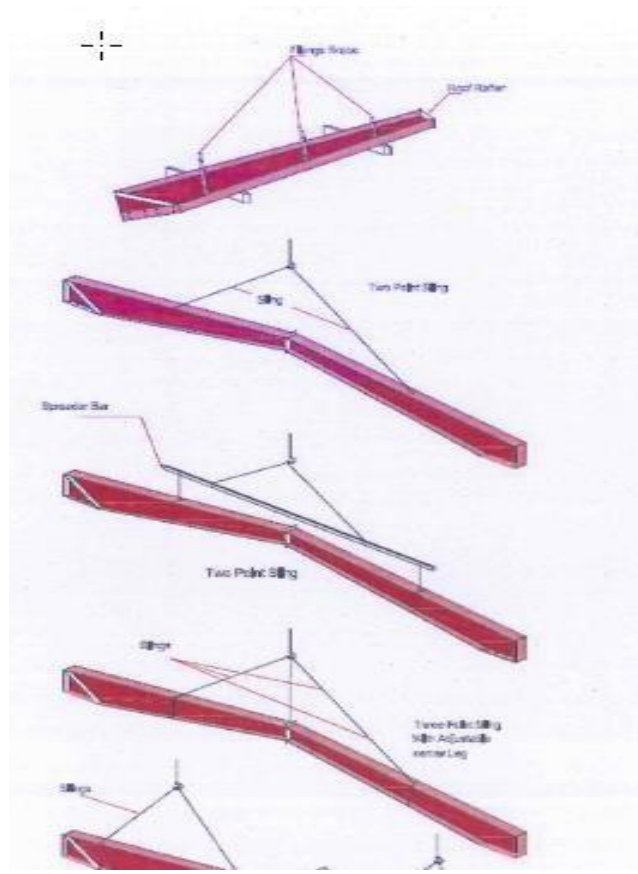


Figure 16 Step1 - steel erection

Sequence:

1. Check anchor bolts plan and erection drawing for special conditions.
2. Stand columns in place and tighten anchor bolt nuts.
3. Attach girds and install temporary bracing

- Note: all columns should be erected just prior to roof rafter andsecondary framing erection.



Rafters Erection & Lifting System

Attachment of flange braces on the ground.

Check primary framing drawings for flangebrace locations.

Attach flange braces to the roof rafter assembly while on the ground on one side.

Attach flange braces to opposite side whenroof rafter assembly raised into vertical position.

Step 2

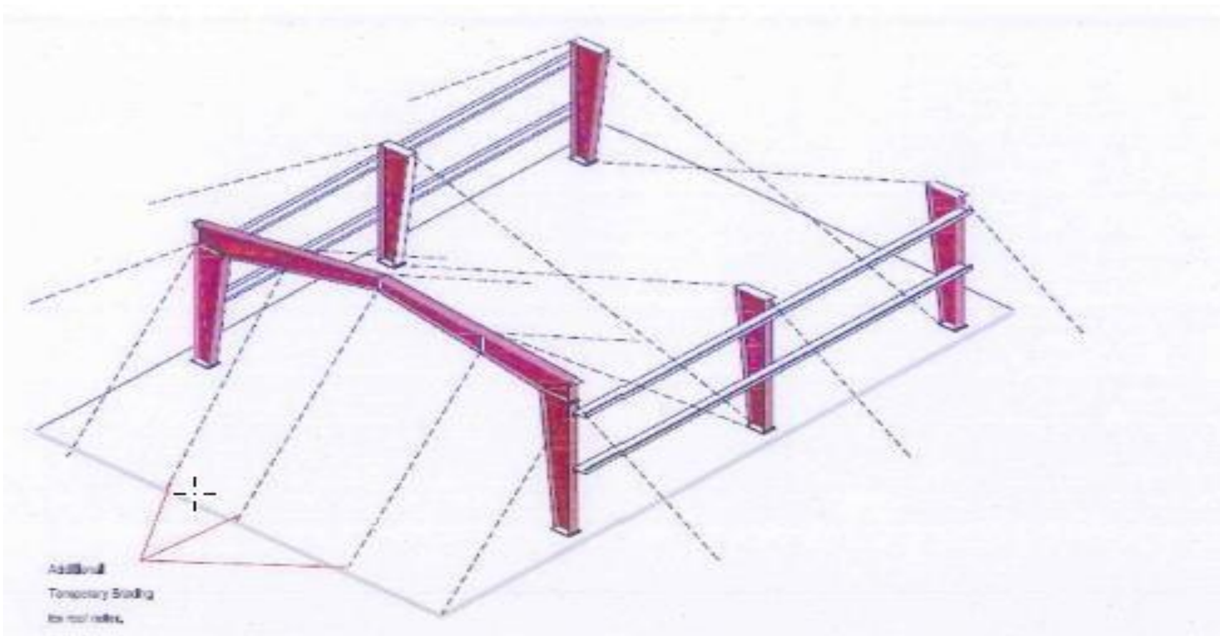


Figure 17 Step 2 - steel erection

1. Raise rafter beam into place.
2. Hold rafter beam in place until it is securely bolted to the column andtemporary bracing is installed to hold assembled frame in place.

Notes:

- Assemble roof rafter components on the ground.
- Make sure roof rafter is level and straight before structural bolts arefully tightened.
- Bolt in place as many clips and flange brace as possible before raisingroof rafters to reduce erection time as it is easier to assemble these pieces on the ground than it is to do in the air.

Step 3

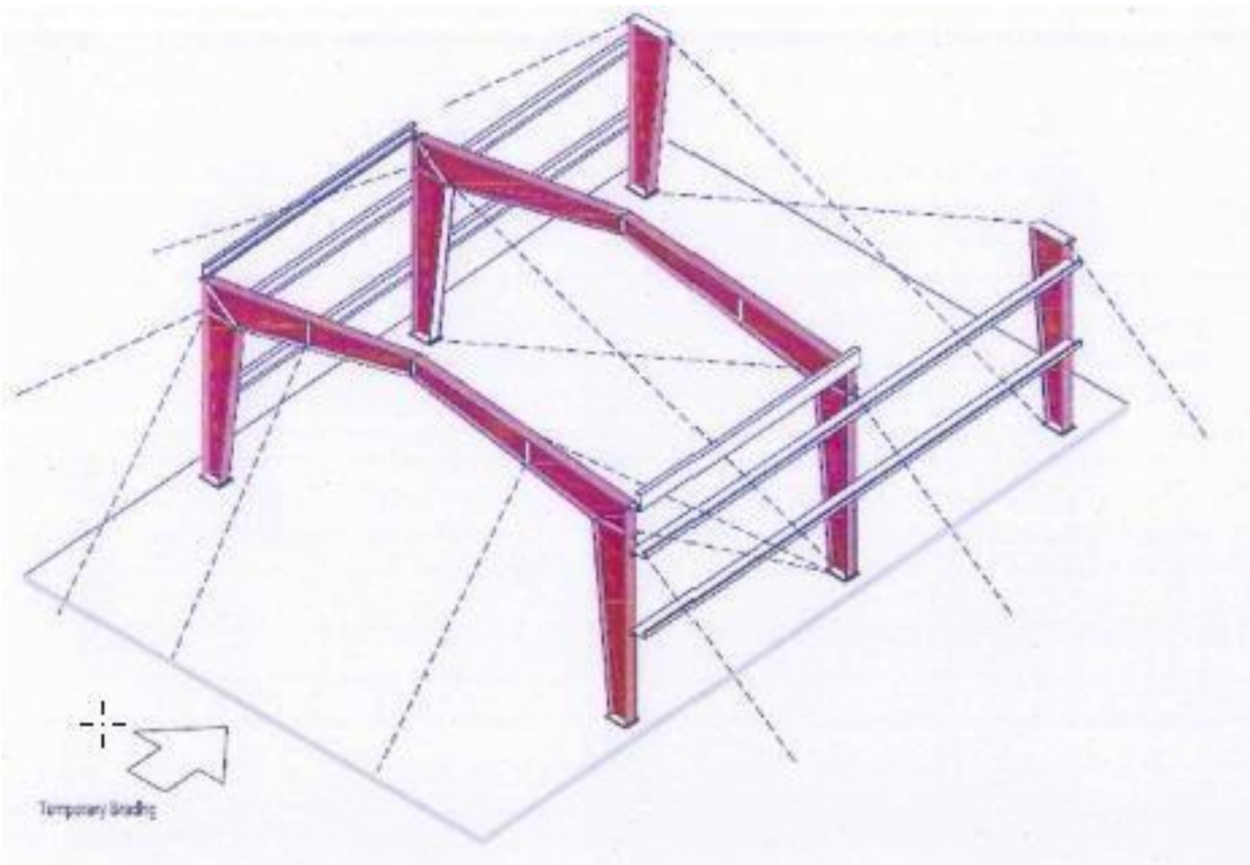


Figure 18 Step 3 - steel erection

Sequence

1. Raise second rafter beams.

2. Hold rafter beam in place until this section is bolted to columns and peakpurling and eave struts have been bolted in place.

Step 4

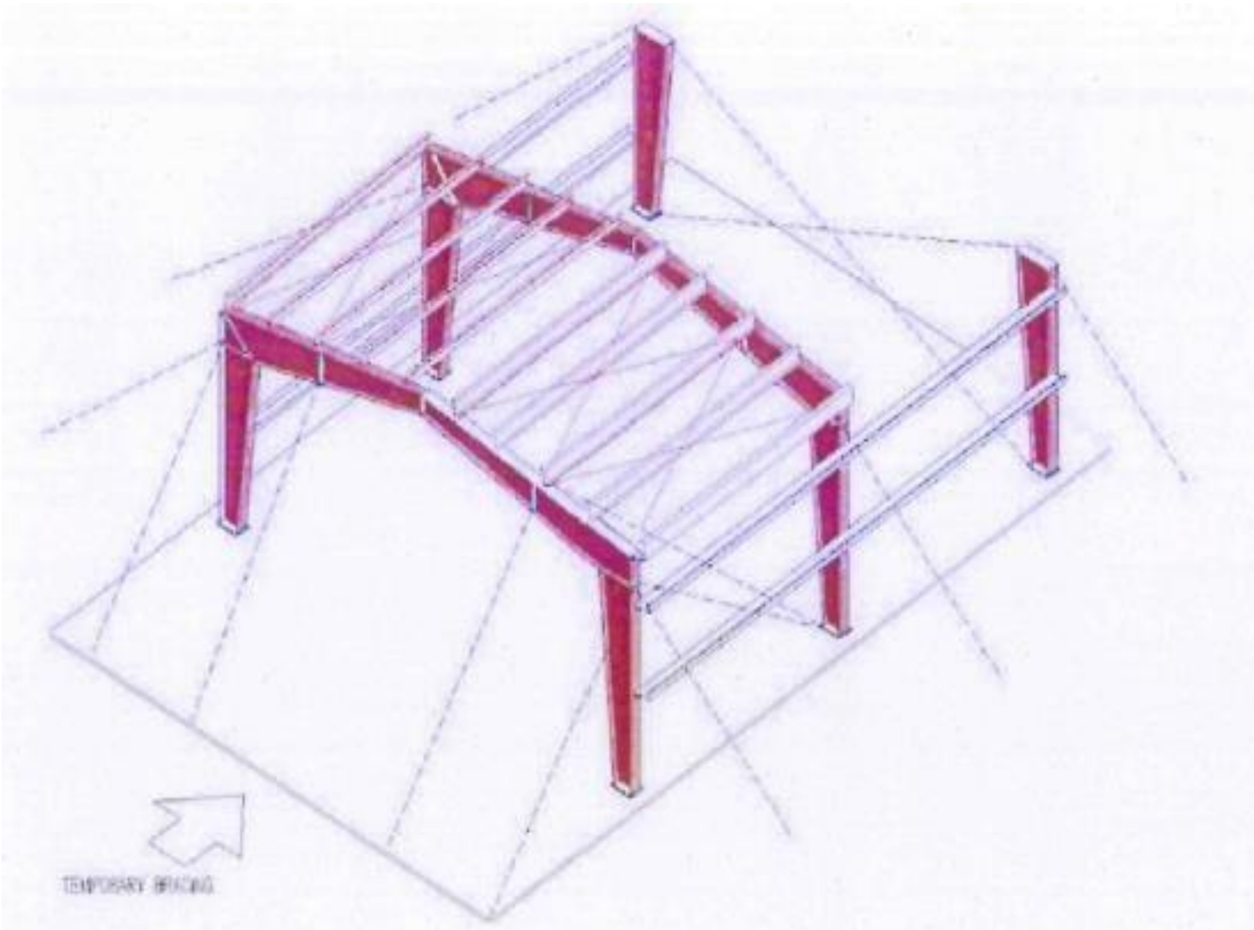


Figure 19 Step 4 - steel erection

Sequence:

1. Bolt all remaining girds and purling in place in the braced way.
2. Install bracing and flange braces.
3. Proceed to plumb and square the braced bay.

Step 5

Sequence:

1. With all the rods loosely installed, plumb the columns of the rigid frame by lightening or loosening the nut on the brace rods, when onebrace rod is tightened the other rod must be loosened.

2. The roof beams should be aligned in progressionfrom the eave to the ridge.

   plumb the roof rafter at each connection pointand the ridge by tightening or loosening the rods at those points.

3. Check to be sure that ridge point of the rigidframe is over the center line of the building

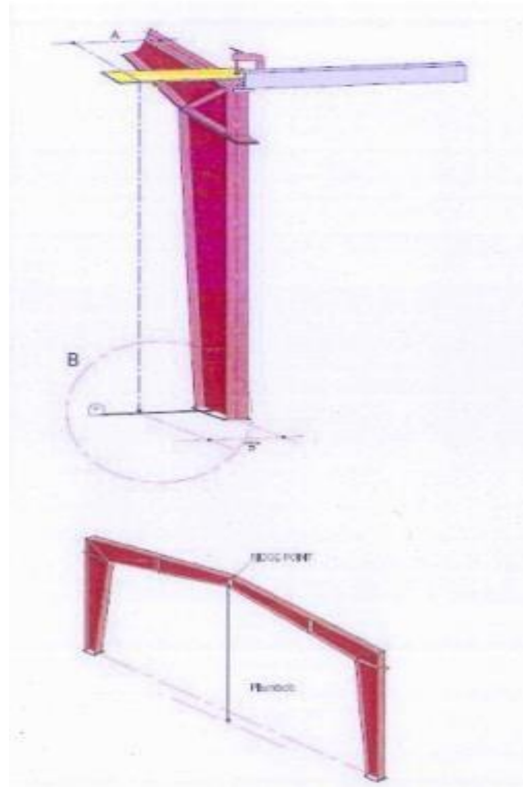
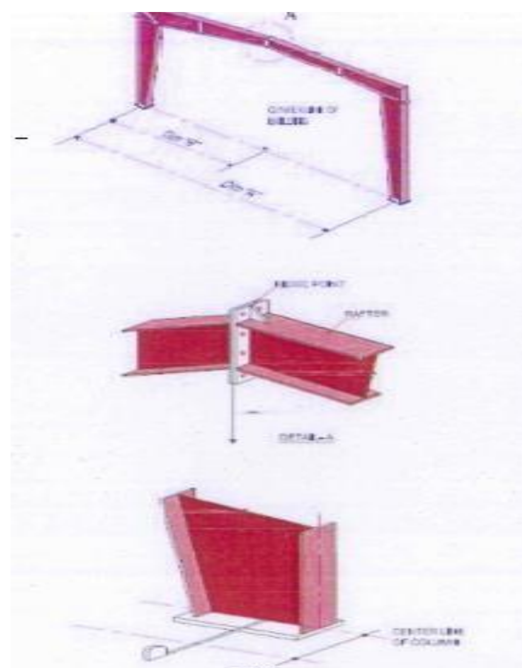
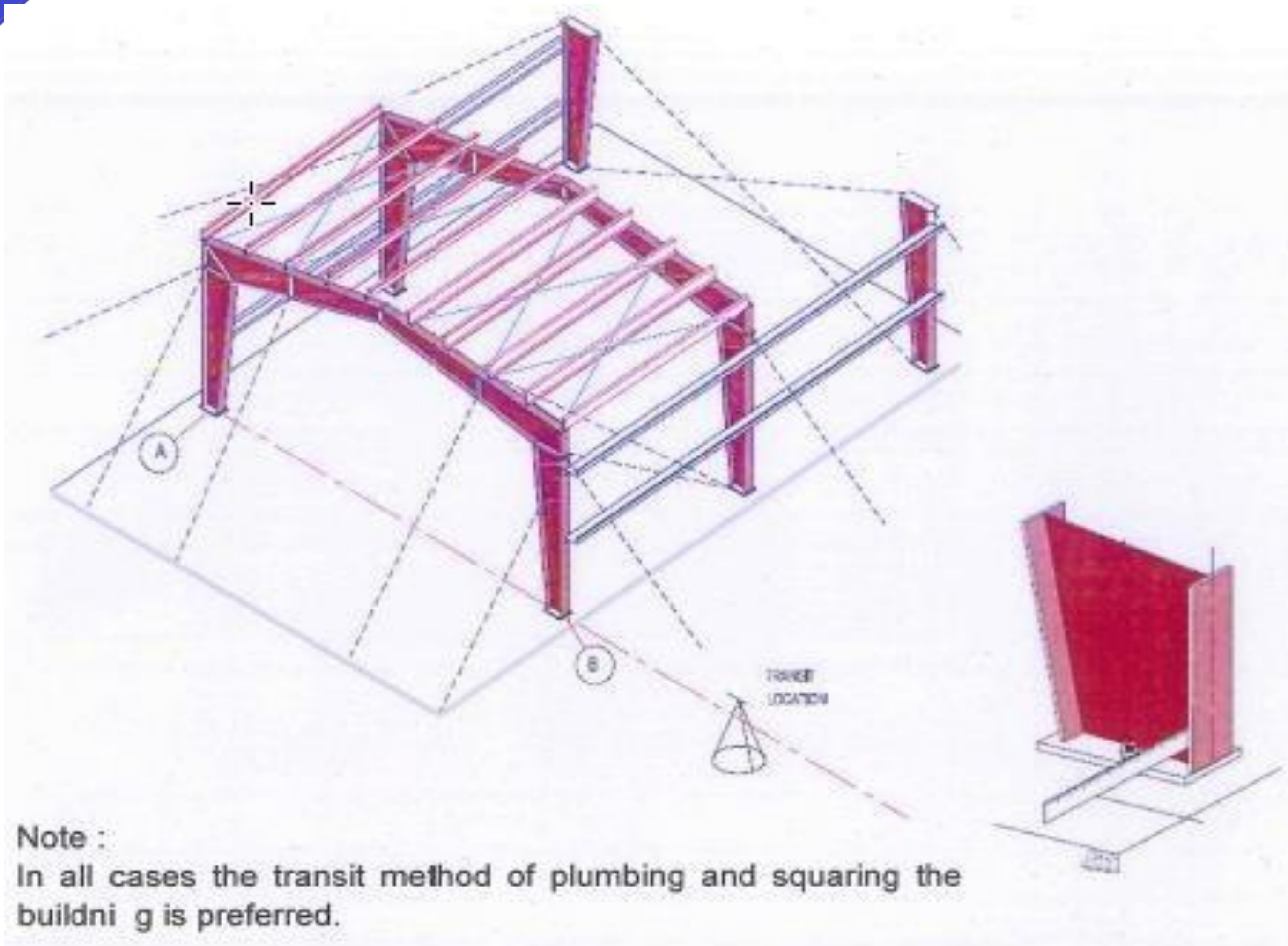


Figure 20 Step 5 - steel erection





Sequence:

1. Locate transit as shown in figure above.
2. Make sure transit is perfectly level.
3. Rotate transit until you get the same exact tape reading at point A&B.
4. Lock horizontal rotation of transit.
5. Adjust rod bracing until the tape reading at point A&B is obtained at allpoints indicated in figure above.

Step 6

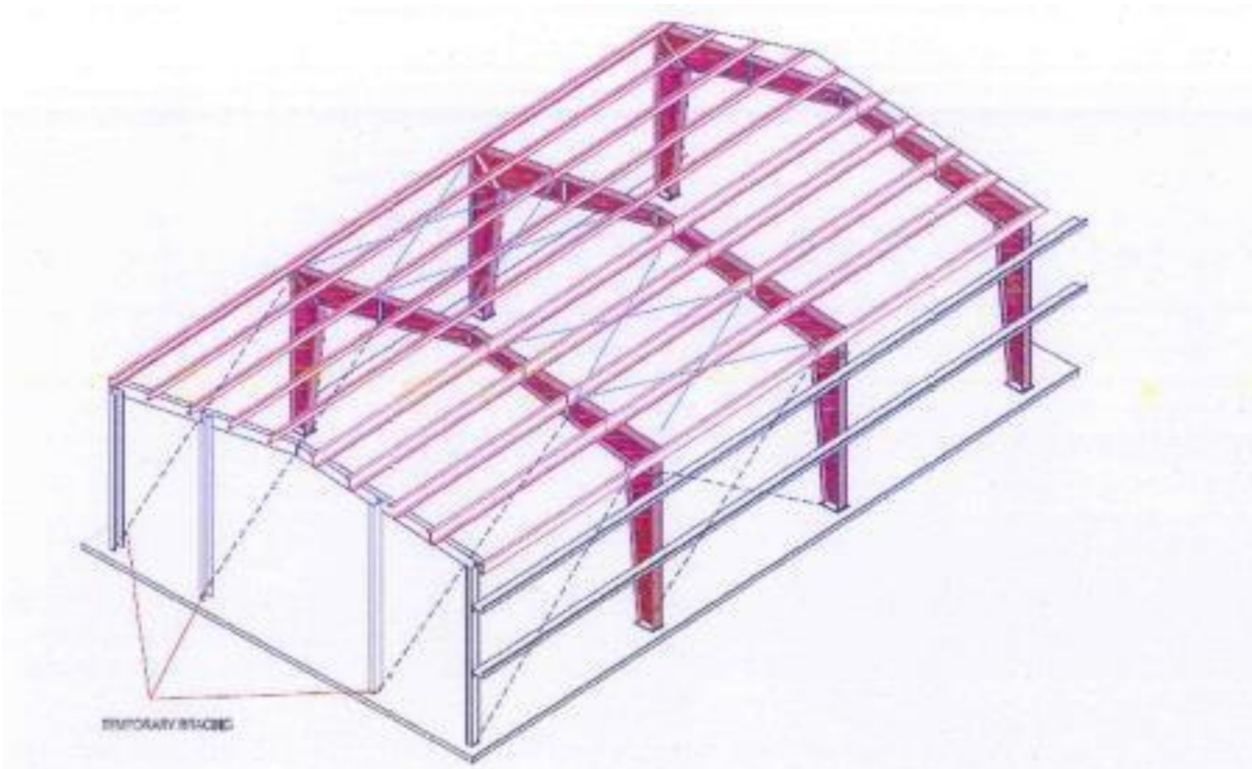


Figure 21Step 6 - steel erection

Sequence:

1. Proceed with the erection of the remaining frames and bearing end frames.

2. In each braced bay shown on the erection drawings.

3. Eave struts and peak purlins may be installed in intermediate bays betweenbraced bays to stabilize frames, however, do not start more work than can be completed in a work day to ensure all structural framing is completed inthose bays before leaving the site at the end of the day.

Step 7

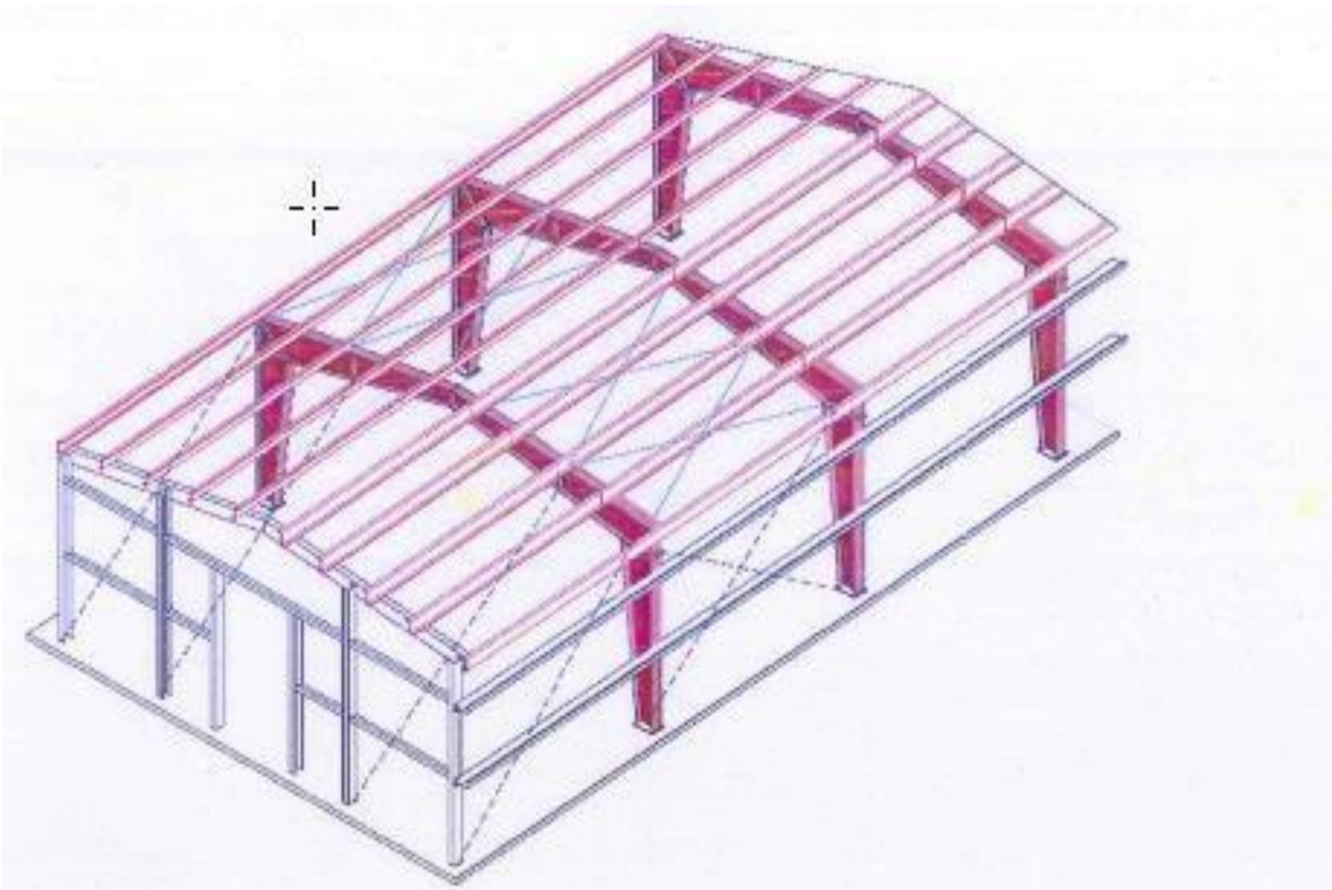


Figure 22 Step 7 - steel erection

Sequence:

1- Complete erection of main and secondary framing

2- Upon completion of all secondary framing in the end bay, paneling may commence and be worked in conjunction with the completion of the balance of the secondary framing, this could save time on larger buildings if separate sheeting crews are used.

Preconstruction phase

- The design team to submit the following information:
  - Critical points (connections, points along members) where tolerancesare most consequential.
  - Anticipated deflections of the fully loaded structure (diagram of deadload deflections).
  - Acceptance criteria for ultrasonic testing.
  - Erection procedure recommendations.
- All purchased materials shall be stored in accordance with the manufacturers/supplier's recommendations to prevent damage ordeterioration.
- Peer review engineer to confirm critical points and conditions where awelding engineer may be recommended to inspect welding work in progress.
- Steel contractor to advise which connections are most likely to be affectedby lamellar tearing or distortion.
- Steel contractor to advise, in advance, when required testing can beperformed.
- Steel contractor to submit erection procedure.
- Steel contractor to submit written quality control program for shop certification and field work, including qualifications and certifications of keypersonnel.
- Steel contractor to submit a detailed schedule (by block number) forfabrication, erection, welding and finishing

Erection phase

- Construction manager to monitor erection progress to confirm workfollows the schedule submitted by the steel contractor.
- Construction manager to hold regular meetings with the contractor, erector, surveyor and testing lab to review ongoing submittals and progress of the work.
- Inspection labs to monitor each bolted connection and confirm it is performed in accordance with approved procedures and submit reports.
- Construction manager to record in reporting system whether work is perapproved procedures.
- Construction manager to confirm all inspections for each member.
- Identify members, connections and critical points that exceed allowabletolerances.

Quality Control (QC)

- The contractor should make available to the inspector and NDT Technicianall drawings, project specifications, mill certifications.
- The contractor should cooperate fully with requests from inspection and testing personnel for access to the connections and joints to be inspected or tested.
- The contractor should be responsible for all necessary corrections of deficiencies in materials and workmanship. The contractor should complywith all requests of the inspector to correct deficiencies.
- Inspections should be performed in a timely manner.
- Project quality engineer ensure that completion of each step according toclient requirement.

Chapter(4)

Planning

Chapter 4 : Planning

4 1.–Introduction

A) Planning

Effective planning is crucial in construction projects to ensure successful project outcomes. Planning involves defining the project's scope, objectives, timelines, resources, and budget, and requires a deep understanding of the project's requirements. A well-planned project can help manage risks ensure timely completion, and meet quality standards. The article will explore the importance of planning in construction projects, the key components of a effective project plan, and best practices for planning and managing construction projects

B) Types of planning

a) Strategic planning: Is an organizational management activity that is used to set priorities, focus energy and resources, strengthen operations, ensure that employees and other stakeholders are working toward common goals, establish agreement around intended outcomes/results, and assesses and adjust the organization’s direction in response to a changing environment.

b) Tactical planning: Sometimes called short-term action plans because they breakdown bigger picture goals and strategies into narrower, actionable tasks.

_***c) Operational planning:*** Is a highly detailed plan that provides a clear picture of how a team, section or department will contribute to the achievement of the organization’s goals. The operational plan maps out the day-to-day tasks required to run a business and cover

4 2.– WBS &Activity listing

The activity list in a construction project is a detailed and organized list of tasks that need to be completed to deliver the project. It includes: :

- Activity ID, description, type, duration, and cost estimate
- Predecessor and successor activities
- Resource requirements

The activity list helps to : :

- Identify all tasks required to complete the project
- Develop a realistic project schedule and budget
- Plan and allocate resources effectively
- Identify and mitigate potential risks
- Monitor and control progress throughout the project

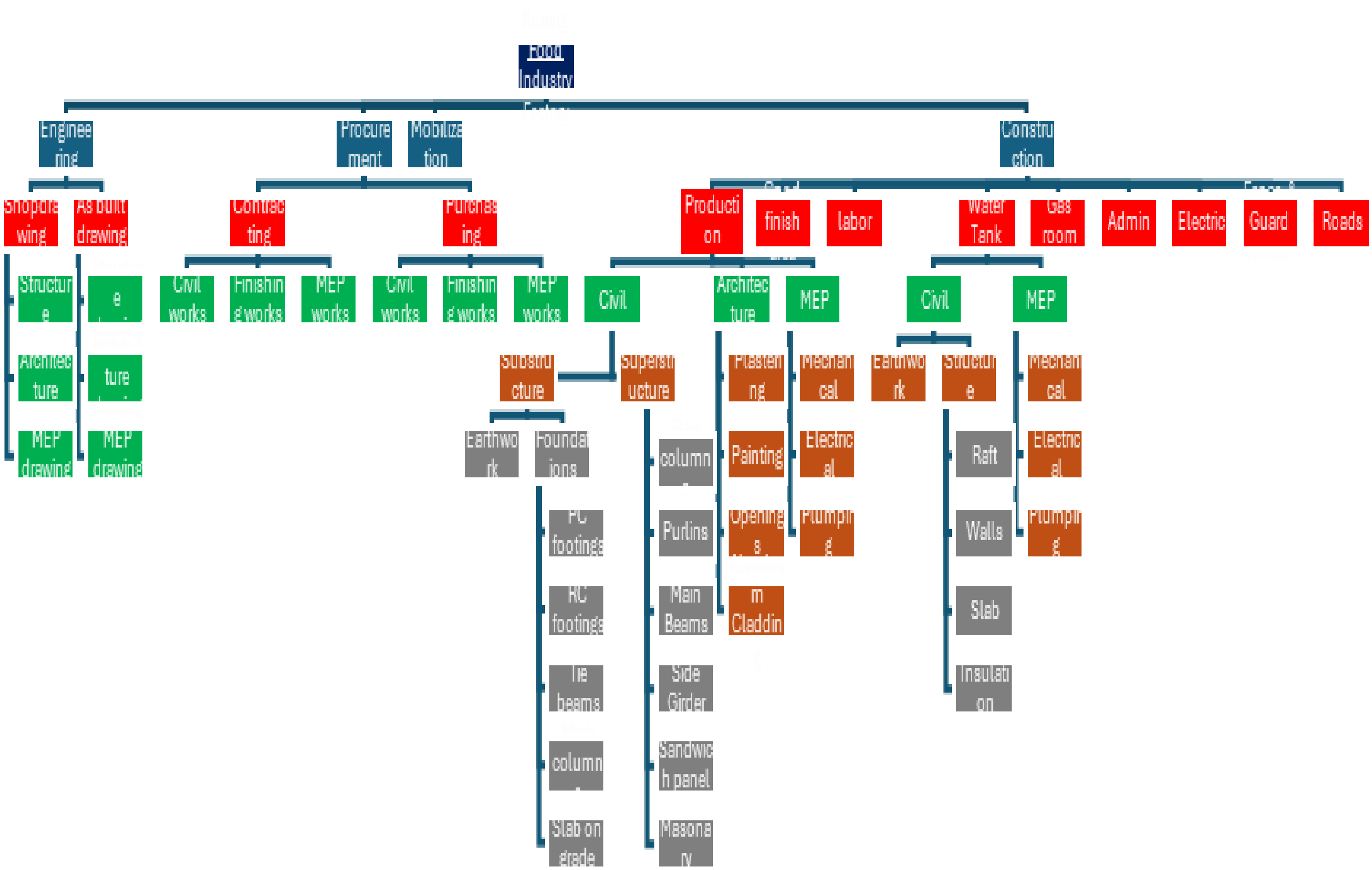
It's an essential tool for managing a construction project, ensuring that all tasks are completed efficiently and effectively, and the project is delivered on time, within budget, and to the required quality standards .

Firstly, we make the WBS to identify the work packages of the project then, assign activities in each work package .

1-Production Hall 2- Good Finishing Area 3- Admin Area 4-Labor

1. Main activities of Sub-structure

1-Excavation 2- Foundations 3- Pedestals 4- RC columns 5- Slab on Grade 6- Insulation 7- Backfill



WBS Coding System

Coding System	
Code	Description
KFI	Koning Factory Industrial
1	General
2	Construction
EW	Earth Works
PH	Production Hall
LB	Labors Building
WT&PR	Water Tank & Pump Room
ElecR	Electric Room
GasR	Gas Room
GFA	Goods Finish Area
AA	Admin Area
F&GR	Fence & Guard Rooms
F	Fence
GR	Guard Rooms
RW	Road Works

CW	Civil Works
Found.	Foundation
Pedes.	Pedestals
Colum.	RC Columns
SOG	Slab On Grade
Form	Formwork
Rft	Rft Work
ConcPour	Concrete Pouring Work
Steel	Steel Works
SSE	Steel Structure Erection
Steel Col	Steel Columns
Girders	Girders
Purlins	Purlins

StBeams	Steel Beams
MetDeck	Metal Decks
Sub	Substructure
Super	Super Structure
FW	Finishing Works
Ins.	Insulation
Mas.	Masonry Works
AMW	Aluminum & Metal Works
PP	Painting & Plastering
MEP	MEP Works
ElecW	Electrical Works
HVAC	HVAC Works
FFW	Fire Fighting Works
PW	Plumbing Works

Production Hall		230	12-May-24	03-Feb-25
Civil Works		132	12-May-24	12-Oct-24
Earth Works		53	12-May-24	11-Jul-24
K1020	Excavation	20	12-May-24	03-Jun-24
K1040	Backfilling	7	04-Jul-24	11-Jul-24
Concrete Works		124	21-May-24	12-Oct-24
Foundation		17	21-May-24	09-Jun-24
Formwork		17	21-May-24	09-Jun-24
K1060	Shuttering PC Footing	2	21-May-24	22-May-24
K1070	Deshuttering PC Footing	1	25-May-24	25-May-24
K1080	Shuttering RC Footing	4	26-May-24	29-May-24
K1090	Deshuttering RC Footing	3	06-Jun-24	09-Jun-24
Rft Work		7	28-May-24	04-Jun-24
K1100	Steel Fixing RC Footing	7	28-May-24	04-Jun-24
Concrete Pouring Work		12	23-May-24	05-Jun-24
K1110	Placing PC Footing	1	23-May-24	23-May-24
K1120	Placing RC Footing	2	04-Jun-24	05-Jun-24
Pedestals		19	09-Jun-24	30-Jun-24
Formwork		17	11-Jun-24	30-Jun-24
K1130	Shuttering Pedestals	7	11-Jun-24	18-Jun-24
K1140	Dehuttering Pedestals	5	25-Jun-24	30-Jun-24
Rft Work		5	09-Jun-24	13-Jun-24
K1150	Steel Fixing Pedestals	5	09-Jun-24	13-Jun-24
Concrete Pouring Work		7	18-Jun-24	25-Jun-24
K1160	First Placing Pedestals	2	18-Jun-24	19-Jun-24
K1170	Second Placing Pedestals	2	24-Jun-24	25-Jun-24
RC Columns		17	23-Sep-24	12-Oct-24
Formwork		15	25-Sep-24	12-Oct-24
K1180	Shuttering RC Columns	8	25-Sep-24	03-Oct-24
K1190	Deshuttering RC Columns	5	07-Oct-24	12-Oct-24
Rft Work		2	23-Sep-24	24-Sep-24
K1200	Steel Fixing RC Columns	2	23-Sep-24	24-Sep-24
Concrete Pouring Work		2	05-Oct-24	06-Oct-24
K1210	Placing RC Columns	2	05-Oct-24	06-Oct-24
Slab on Grade		16	23-Sep-24	10-Oct-24
Formwork		16	23-Sep-24	10-Oct-24
K1220	Shuttering SOG	4	23-Sep-24	26-Sep-24
K1230	Dehuttering SOG	3	08-Oct-24	10-Oct-24
Rft Work		8	28-Sep-24	06-Oct-24
K1240	Steel Fixing SOG	8	28-Sep-24	06-Oct-24
Concrete Pouring Work		2	06-Oct-24	07-Oct-24
K1250	Placing SOG	2	06-Oct-24	07-Oct-24
Foundation Insulation		7	29-Jun-24	06-Jul-24
K1260	Foundation Insulation	7	29-Jun-24	06-Jul-24

2. Main activities of Super-structure (Steel structure Erection)

1-Steel columns 2- Girders 3- Purlins

Steel Works		52	19-Jun-24	18-Aug-24
Steel Structure Erection		52	19-Jun-24	18-Aug-24
Steel Columns		23	19-Jun-24	15-Jul-24
K1270	Anchor Bolts and Plates	5	19-Jun-24	24-Jun-24
K1280	Installing Columns	3	13-Jul-24	15-Jul-24
Girders		3	23-Jul-24	25-Jul-24
K1290	Installing Main Beams	3	23-Jul-24	25-Jul-24
Purlins		29	16-Jul-24	18-Aug-24
K1300	Installing Side Beams	6	16-Jul-24	22-Jul-24
K1310	Installing Roof Beams	20	27-Jul-24	18-Aug-24

3-Main activities of Architecture works

1-Masonary works 2- Sandwich Panels 3- Openings 4- Finishes

Architecture Works		155	07-Aug-24	03-Feb-25
Masonry Works		25	13-Oct-24	10-Nov-24
K1320	Masonry Works	25	13-Oct-24	10-Nov-24
Sandwich Panels Works		40	07-Aug-24	22-Sep-24
K1330	Sandwich Panels Fixation	40	07-Aug-24	22-Sep-24
Openings and Facade works		71	13-Nov-24	03-Feb-25
K1350	Aliminum Doors	2	13-Nov-24	14-Nov-24
K1360	Metal Doors	2	13-Nov-24	14-Nov-24
K1340	Facade Aliminum	5	29-Jan-25	03-Feb-25
Finishes		71	07-Nov-24	28-Jan-25
K1380	Plastering	5	07-Nov-24	12-Nov-24
K7622	Painting	5	14-Jan-25	19-Jan-25
K1370	Epoxy Flooring	8	20-Jan-25	28-Jan-25

4. Main activities of MEP works

1-Electric Works 2- HVAC Works 3- Fire Fighting Works 4- Plumbing Works

MEP Works		65	11-Nov-24	25-Jan-25
Electrical Works		39	17-Nov-24	31-Dec-24
1st fix		30	17-Nov-24	21-Dec-24
K7631	Electrical first fix	20	17-Nov-24	09-Dec-24
K7632	Light current cables	20	25-Nov-24	17-Dec-24
K7633	Electric cabling	20	28-Nov-24	21-Dec-24
2nd fix		23	05-Dec-24	31-Dec-24
K7634	Generators	10	05-Dec-24	16-Dec-24
K7635	Transformer	10	05-Dec-24	16-Dec-24
K7640	Fire Alarm System	15	11-Dec-24	28-Dec-24
K7639	MV Cable	15	15-Dec-24	31-Dec-24
3rd fix		17	09-Dec-24	28-Dec-24
K7636	Wiring devices	15	09-Dec-24	25-Dec-24
K7637	Lighting fixtures	15	11-Dec-24	28-Dec-24
K7638	Light current fixtures & equ	15	11-Dec-24	28-Dec-24
HVAC Works		33	13-Nov-24	21-Dec-24
1st fix		23	13-Nov-24	09-Dec-24
K7623	Ducts Works	15	13-Nov-24	30-Nov-24
K7624	Piping Works	15	13-Nov-24	30-Nov-24
K7626	Diffusers & Grills	15	21-Nov-24	08-Dec-24
K7627	Chillers	15	23-Nov-24	09-Dec-24
2nd fix		15	23-Nov-24	09-Dec-24
K7628	AHUs	15	23-Nov-24	09-Dec-24
K7629	Pumps	15	23-Nov-24	09-Dec-24
3rd fix		26	21-Nov-24	21-Dec-24
K7625	Fans installation	15	21-Nov-24	08-Dec-24
K7630	Split units	4	17-Dec-24	21-Dec-24
Fire Fighting Works		65	11-Nov-24	25-Jan-25
1st fix		20	11-Nov-24	03-Dec-24
K7641	Piping & Valves Works	20	11-Nov-24	03-Dec-24
2nd fix		20	17-Nov-24	09-Dec-24
K7642	Sprinklers	20	17-Nov-24	09-Dec-24
3rd fix		18	05-Jan-25	25-Jan-25
K7643	Fire Extinguishers	15	05-Jan-25	21-Jan-25
K7644	Fire hose cabinets	10	14-Jan-25	25-Jan-25

Fire Fighting Works		65	11-Nov-24	25-Jan-25
1st fix		20	11-Nov-24	03-Dec-24
K7641	Piping & Valves Works	20	11-Nov-24	03-Dec-24
2nd fix		20	17-Nov-24	09-Dec-24
K7642	Sprinklers	20	17-Nov-24	09-Dec-24
3rd fix		18	05-Jan-25	25-Jan-25
K7643	Fire Extinguishers	15	05-Jan-25	21-Jan-25
K7644	Fire hose cabinets	10	14-Jan-25	25-Jan-25
Plumbing Works		49	17-Nov-24	12-Jan-25
1st fix		39	17-Nov-24	31-Dec-24
K7645	Piping Works	20	17-Nov-24	09-Dec-24
K7646	Air Compressors	15	15-Dec-24	31-Dec-24
2nd fix		20	15-Dec-24	06-Jan-25
K7647	Chambers & Manholes	20	15-Dec-24	06-Jan-25
3rd fix		20	21-Dec-24	12-Jan-25
K7648	Plumbing Fixtures	20	21-Dec-24	12-Jan-25
K7649	Floor Drains & Cleanout	15	26-Dec-24	12-Jan-25

5- Electric room 6- Gas room 7- Fence & Guard room

1-Main activities of Civil Works

Civil Works		38	04-Sep-24	17-Oct-24
Earth Works		15	04-Sep-24	21-Sep-24
K2190	Excavation	1	04-Sep-24	04-Sep-24
K2210	Backfilling	1	21-Sep-24	21-Sep-24
Concrete Works		36	07-Sep-24	17-Oct-24
Foundation		7	07-Sep-24	14-Sep-24
Formwork		7	07-Sep-24	14-Sep-24
K2230	Shuttering PC Footing	1	07-Sep-24	07-Sep-24
K2240	Deshuttering PC Footing	1	09-Sep-24	09-Sep-24
K2250	Shuttering RC Footing	1	10-Sep-24	10-Sep-24
K2260	Deshuttering RC Footing	1	14-Sep-24	14-Sep-24
Rft Work		1	11-Sep-24	11-Sep-24
K2270	Steel Fixing RC Footing	1	11-Sep-24	11-Sep-24
Concrete Pouring Work		5	08-Sep-24	12-Sep-24
K2280	Placing PC Footing	1	08-Sep-24	08-Sep-24
K2290	Placing RC Footing	1	12-Sep-24	12-Sep-24
RC Columns		4	15-Sep-24	18-Sep-24
Formwork		3	16-Sep-24	18-Sep-24
K2300	Shuttering RC Columns	1	16-Sep-24	16-Sep-24
K2310	Dehuttering RC Columns	1	18-Sep-24	18-Sep-24
Rft Work		1	15-Sep-24	15-Sep-24
K2320	Steel Fixing RC Columns	1	15-Sep-24	15-Sep-24
Concrete Pouring Work		1	17-Sep-24	17-Sep-24
K2330	Placing RC Columns	1	17-Sep-24	17-Sep-24
Foundation Insulation		1	19-Sep-24	19-Sep-24
K2340	Foundation Insulation	1	19-Sep-24	19-Sep-24
Roof Slab		10	07-Oct-24	17-Oct-24
Formwork		10	07-Oct-24	17-Oct-24
K2350	Shuttering Roof Slab	2	07-Oct-24	08-Oct-24
K2360	Deshuttering Roof Slab	1	17-Oct-24	17-Oct-24
Rft Work		1	09-Oct-24	09-Oct-24
K2370	Steel Fixing Roof Slab	1	09-Oct-24	09-Oct-24
Concrete Pouring Work		1	10-Oct-24	10-Oct-24
K2380	Placing Roof Slab	1	10-Oct-24	10-Oct-24
Slab on Grade		11	22-Sep-24	03-Oct-24
Formwork		11	22-Sep-24	03-Oct-24
K2390	Shuttering SOG	1	22-Sep-24	22-Sep-24
K2400	Dehuttering SOG	1	03-Oct-24	03-Oct-24
Rft Work		1	23-Sep-24	23-Sep-24
K2410	Steel Fixing SOG	1	23-Sep-24	23-Sep-24
Concrete Pouring Work		1	24-Sep-24	24-Sep-24
K2420	Placing SOG	1	24-Sep-24	24-Sep-24

2. Main activities of Architecture works

Architecture Works		59	19-Oct-24	25-Dec-24
Masonry Works		2	19-Oct-24	20-Oct-24
K2440	Masonry Works	2	19-Oct-24	20-Oct-24
Insulation		1	21-Oct-24	21-Oct-24
K2430	Roof Insulation	1	21-Oct-24	21-Oct-24
Painting & Plastering		57	21-Oct-24	25-Dec-24
K2450	Internal Ceiling	1	21-Oct-24	21-Oct-24
K2460	Walls	1	11-Dec-24	11-Dec-24
K2470	Floor	1	12-Dec-24	12-Dec-24
K2480	Facade	1	25-Dec-24	25-Dec-24

3. Main activities of MEP works

MEP Works		43	22-Oct-24	10-Dec-24
Electrical Works		33	22-Oct-24	28-Nov-24
1st fix		25	22-Oct-24	19-Nov-24
K5704	Electrical first fix	20	22-Oct-24	13-Nov-24
K5714	Light current first fix	20	22-Oct-24	13-Nov-24
K5724	Light current cables	20	28-Oct-24	19-Nov-24
K5734	Electric cabling	5	28-Oct-24	02-Nov-24
2nd fix		8	20-Nov-24	28-Nov-24
K5764	Wiring devices	5	20-Nov-24	25-Nov-24
K5804	Fire Alarm System	3	20-Nov-24	23-Nov-24
K5774	Lighting fixtures	1	26-Nov-24	26-Nov-24
K5784	Light current fixtures & equ	2	27-Nov-24	28-Nov-24
Fire Fighting Works		10	30-Nov-24	10-Dec-24
1st fix		1	30-Nov-24	30-Nov-24
K7361	Fire Extinguishers	1	30-Nov-24	30-Nov-24
2nd fix		8	02-Dec-24	10-Dec-24
K7351	Fire System	8	02-Dec-24	10-Dec-24
HVAC Works		7	27-Nov-24	04-Dec-24
K7546	Fans Installation	5	27-Nov-24	02-Dec-24
K7547	Glouvers Installation	5	30-Nov-24	04-Dec-24
Plumbing Works		2	22-Oct-24	23-Oct-24
1st fix		2	22-Oct-24	23-Oct-24
K7331	Piping Works	2	22-Oct-24	23-Oct-24
2nd fix		2	22-Oct-24	23-Oct-24
K7341	Roof Drain	2	22-Oct-24	23-Oct-24

8-Water Tank & Pump Room

1. Main activities of Civil Works

Water Tank & Pump Room		90	19-Aug-24	01-Dec-24
Civil Works		88	19-Aug-24	28-Nov-24
Earth Works		48	19-Aug-24	13-Oct-24
K1950	Excavation	4	19-Aug-24	22-Aug-24
K5093	Backfilling	1	13-Oct-24	13-Oct-24
Concrete Works		84	24-Aug-24	28-Nov-24
Foundation		11	24-Aug-24	04-Sep-24
Formwork		11	24-Aug-24	04-Sep-24
K1990	Shuttering PC Raft	1	24-Aug-24	24-Aug-24
K2000	Deshuttering PC Raft	1	26-Aug-24	26-Aug-24
7603	Shuttering RC Raft	2	27-Aug-24	28-Aug-24
K2020	Deshuttering RC Raft	1	04-Sep-24	04-Sep-24
Rft Work		3	29-Aug-24	01-Sep-24
K2030	Steel fixing RC Raft	3	29-Aug-24	01-Sep-24
Concrete Pouring Work		9	25-Aug-24	03-Sep-24
K2040	Placing PC Raft	1	25-Aug-24	25-Aug-24
K2050	Placing RC Raft	1	03-Sep-24	03-Sep-24
Water Stop		1	02-Sep-24	02-Sep-24
K2060	Water Stop Fixing	1	02-Sep-24	02-Sep-24
Walls		16	05-Sep-24	23-Sep-24
Formwork		16	05-Sep-24	23-Sep-24
K2070	Shuttering Walls	6	05-Sep-24	11-Sep-24
K2080	Deshuttering Walls	4	19-Sep-24	23-Sep-24
Rft Work		5	12-Sep-24	17-Sep-24
K2090	Steel Fixing Walls	5	12-Sep-24	17-Sep-24
Concrete Pouring Work		1	18-Sep-24	18-Sep-24
K2100	Placing Walls	1	18-Sep-24	18-Sep-24
Roof Slab		15	12-Nov-24	28-Nov-24
Formwork		15	12-Nov-24	28-Nov-24
K2110	Shuttering Roof Slab	3	12-Nov-24	14-Nov-24
K2120	Deshuttering Roof Slab	2	27-Nov-24	28-Nov-24
Rft Work		4	16-Nov-24	19-Nov-24
K2130	Steel Fixing Roof Slab	4	16-Nov-24	19-Nov-24
Concrete Pouring Work		1	20-Nov-24	20-Nov-24
K2140	Placing Roof Slab	1	20-Nov-24	20-Nov-24

2. Main activities of Architecture works

Architecture Works		59	24-Sep-24	01-Dec-24
Metal Works		2	30-Nov-24	01-Dec-24
K2150	Metal Doors and Openninc	2	30-Nov-24	01-Dec-24
Insulation		16	24-Sep-24	12-Oct-24
K2160	Internal Insulation	4	24-Sep-24	28-Sep-24
K2170	Water Test	8	29-Sep-24	07-Oct-24
K2180	External Insulation	4	08-Oct-24	12-Oct-24

3. Main activities of MEP works

MEP Works		25	14-Oct-24	11-Nov-24
1st fix		25	14-Oct-24	11-Nov-24
K7538	Pipings & Fittings	25	14-Oct-24	11-Nov-24
K7539	Pumps Installation	25	14-Oct-24	11-Nov-24
2nd fix		14	14-Oct-24	29-Oct-24
K7540	Ventilation System	7	14-Oct-24	21-Oct-24
K7541	Electrical first fix	7	14-Oct-24	21-Oct-24
K7542	Light Current first fix	7	14-Oct-24	21-Oct-24
K7543	Electrical Cables	7	22-Oct-24	29-Oct-24
Phase 3		8	30-Oct-24	07-Nov-24
K7544	Fire Alarm System	7	30-Oct-24	06-Nov-24
K7545	Fire Extinguishers	1	07-Nov-24	07-Nov-24

9-Road Works

Road Works		104	23-Oct-24	20-Feb-25
Civil Works		70	23-Oct-24	12-Jan-25
Earth Works		19	23-Oct-24	13-Nov-24
K4550	Backfilling	11	23-Oct-24	04-Nov-24
K7537	Subgrade Perparation	8	05-Nov-24	13-Nov-24
Ramp & Basquel Scale Slab on Grade		11	31-Dec-24	12-Jan-25
Formwork		11	31-Dec-24	12-Jan-25
K4580	Shuttering SOG	2	31-Dec-24	01-Jan-25
K4590	Dehuttering SOG	2	11-Jan-25	12-Jan-25
Rft Work		5	02-Jan-25	07-Jan-25
K4600	Steel Fixing SOG	5	02-Jan-25	07-Jan-25
Concrete Pouring Work		2	08-Jan-25	09-Jan-25
K4610	Placing SOG	2	08-Jan-25	09-Jan-25
Architecture Works		45	31-Dec-24	20-Feb-25
K4620	Concrete Curbs	20	31-Dec-24	22-Jan-25
K4630	Interlock Works	20	06-Jan-25	28-Jan-25
K4640	Wheel stoppers & Ballard	20	29-Jan-25	20-Feb-25
K4650	Planting Works	15	29-Jan-25	15-Feb-25
K4660	Marking & Signs	15	29-Jan-25	15-Feb-25
K4670	Exterior Lighting Fixtures	15	29-Jan-25	15-Feb-25
K4680	Bench Seats	4	29-Jan-25	02-Feb-25

4 3. – Duration estimate

We will start to estimate the durations of Main Activities in each Work Package and the number of used crews. The used equation to calculate durations:

Duration = $\underline{Quantity\ /Productivity\ rate * NO.of\ crew}$

The Used Productivity Rates were brought from:

- Site and Technical Officers.
- Experts Judgement.

• The Used Number of Crews was gotten from.

• **Using reference and company resources to decide number of crews available to execute work** Trial and error calculations. We used the Contract durations as boundaries to finish the work through; so, Different trials were made till we reached these numbers of crews.

• **The Used Quantities were gotten from:** The quantity taking-off we have made. We have made quantity taking off using two different methods and compared the results with the original Bill of Quantities (BOQ).

These two tools are:

1-AutoCAD.

2-Excel.

Earth works duration estimate:

WBS Name	Activity Name	Quantity	Uni	Crew Description	Productivity/d	No. of Crew	Duration(day	final duration
Production Hall								
Earth Works								
	Excavation	3680	m3	1 excavator+2 trucks+ 1 syeryeyor for all crews	300	1	12.27	13
	Backfilling	8100	m3	1 Loader+2 Truck+ 2 labour+ 1 compactor	450	1	18.00	18
Concrete Works								
Foundation								
Formwork								
	Shuttering PC Footing	88	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	2	2.00	2
	Deshuttering PC Footing	88	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	2	1.13	2
	Shuttering RC Footing	308	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	2	5.92	6
	Deshuttering RC Footing	308	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	2	3.95	4
Rft Work								
	Steel Fixing RC Footing	25	ton	steel fixer + helper	0.3	8	10.42	11
Concrete Pouring Work								
	Placing PC Footing	615	m2	2 Concrete Mason+5 Labors+1 Pump+1 Operator	3250	1	0.19	1
	Placing RC Footing	207	m3	2 Concrete Mason+5 Labors+1 Pump+1 Operator	100	1	2.07	3
Pedestals								
Formwork								
	Shuttering Pedestals	268	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	10.31	11
	Dehuttering Pedestals	268	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	6.87	7
Rft Work								
	Steel Fixing Pedestals	29	ton	steel fixer + helper	0.5	8	7.25	8
Concrete Pouring Work								
	First Placing Pedestals	18	m3	5 Labors+1 Pump+1 Operator+1 Vibrator	-	1	2.00	2
	Second Placing Pedestals	10	m3	5 Labors+1 Pump+1 Operator+1 Vibrator	-	1	2.00	2
RC Columns								
Formwork								
	Shuttering RC Columns	288	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	11.08	12
	Deshuttering RC Columns	288	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	7.38	8
Rft Work								
	Steel Fixing RC Columns	8.5	ton	steel fixer + helper	0.5	8	2.13	3
Concrete Pouring Work								
	Placing RC Columns	20	m3	5 Labors+1 Pump+1 Operator+1 Vibrator	80	1	2.00	2
Slab on Grade								
Formwork								
	Shuttering SOG	264	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	2	5.08	6
	Dehuttering SOG	264	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	2	3.38	4
Rft Work								
	Steel Fixing SOG	90	ton	steel fixer + helper	0.5	15	12.00	12
Concrete Pouring Work								
	Placing SOG	3330	m2	1 pump + 8 men (1 in charge 3 mason 4	1750	1	1.90	2
Foundation Insulation								
	Foundation Insulation	1650	m2	3 labor+3 helper	180	1	9.17	10

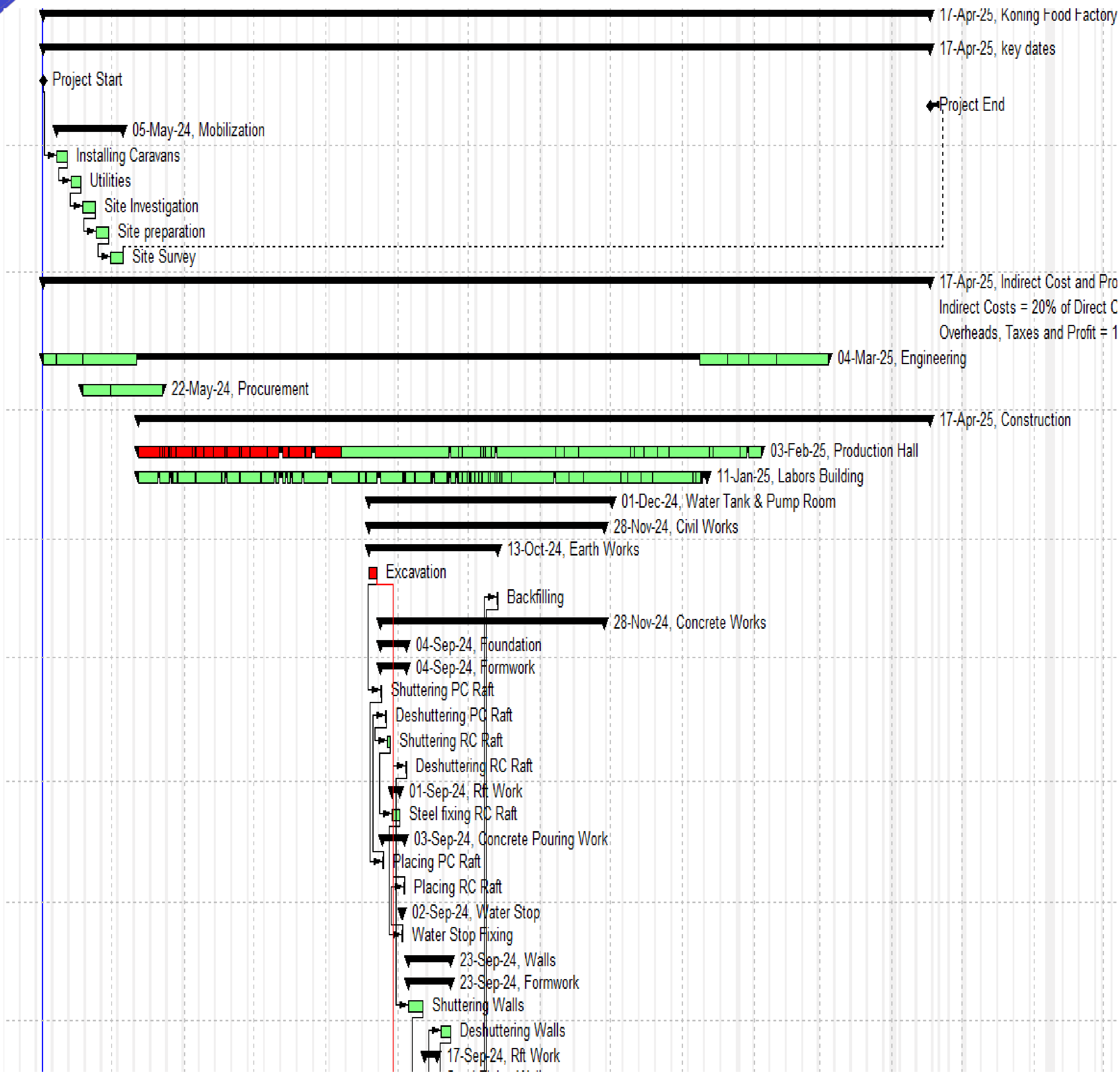
Steel works duration estimate:

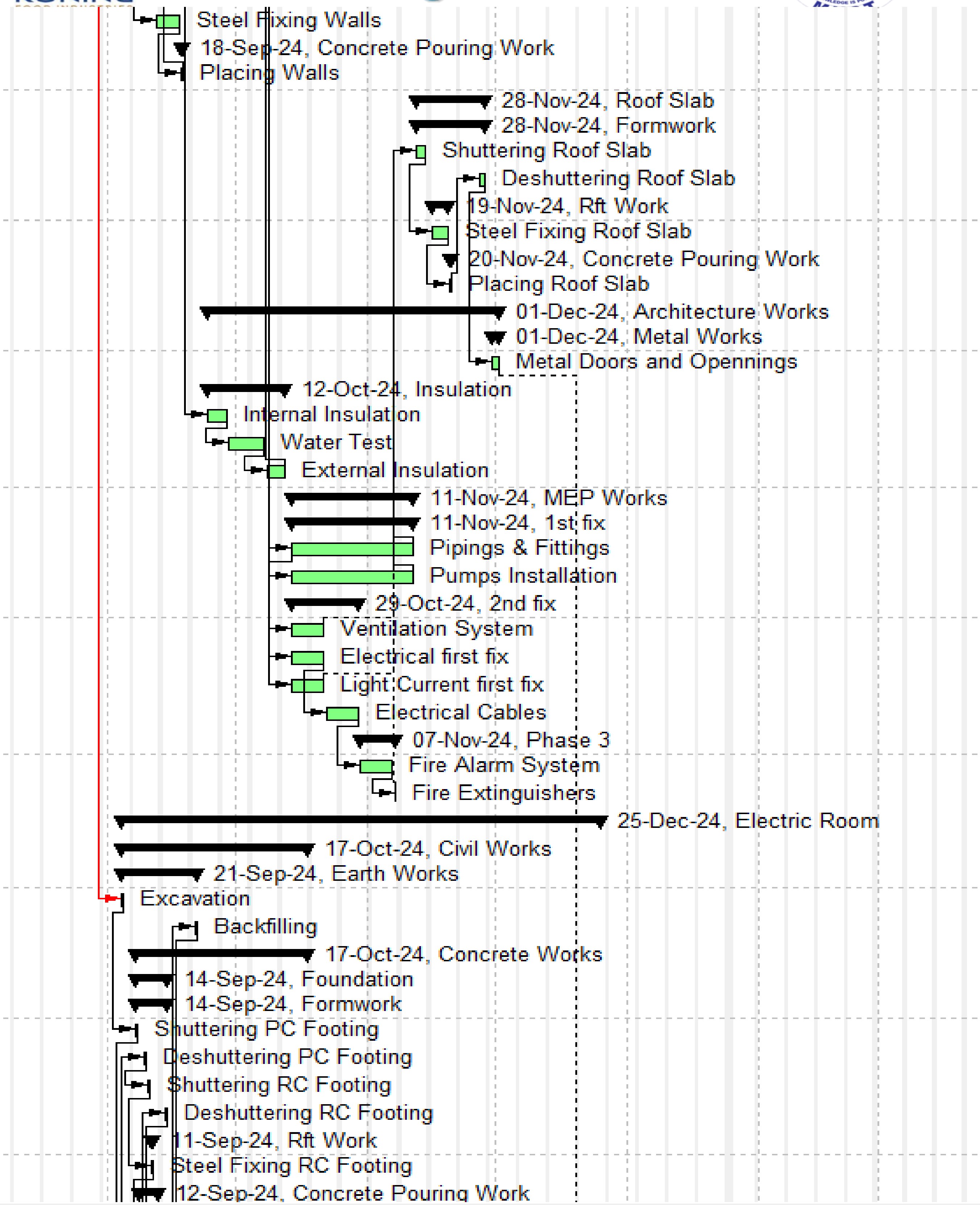
Steel Works								
Steel Structure Erection								
Steel Columns								
	Anchor Bolts and Plates	264	NR	2 Steel Fixer+2 Helper	60	1	4.40	5
	Installing Columns	66	NR	1 Crane+2 Manlift+2 Steel Fixer+2 Helper	15	1	4.40	5
Girders								
	Installing Girders	44	NR	1 Crane+2 Manlift+2 Steel Fixer+2 Helper	10	1	4.40	5
Purlins								
	Installing Side Purlins	84	NR	1 Crane+2 Manlift+2 Steel Fixer+2 Helper	16	1	5.25	6
	Installing Roof Purlins	210	NR	1 Crane+2 Manlift+2 Steel Fixer+2 Helper	18	1	11.67	12

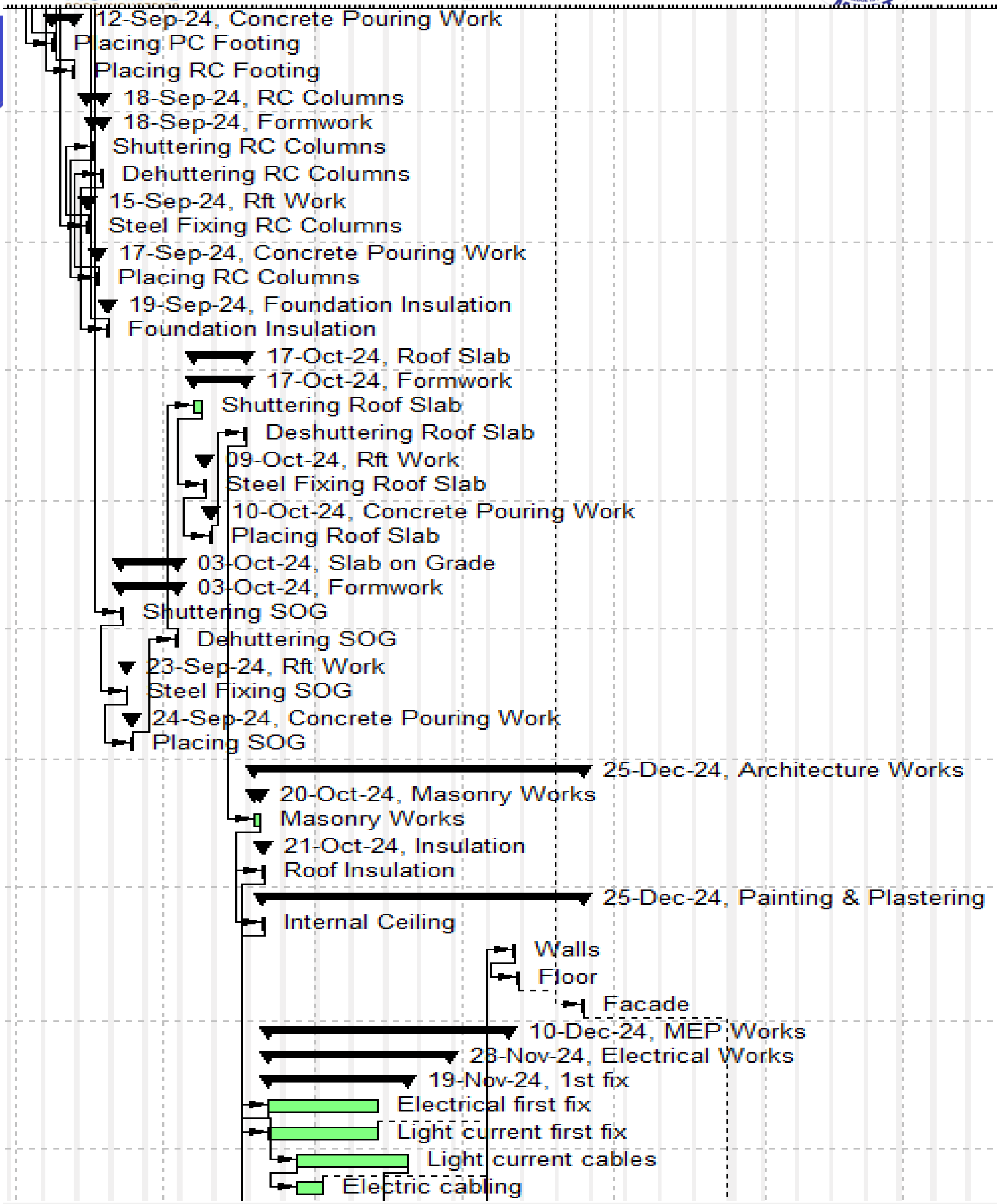
Finishing works duration estimate:

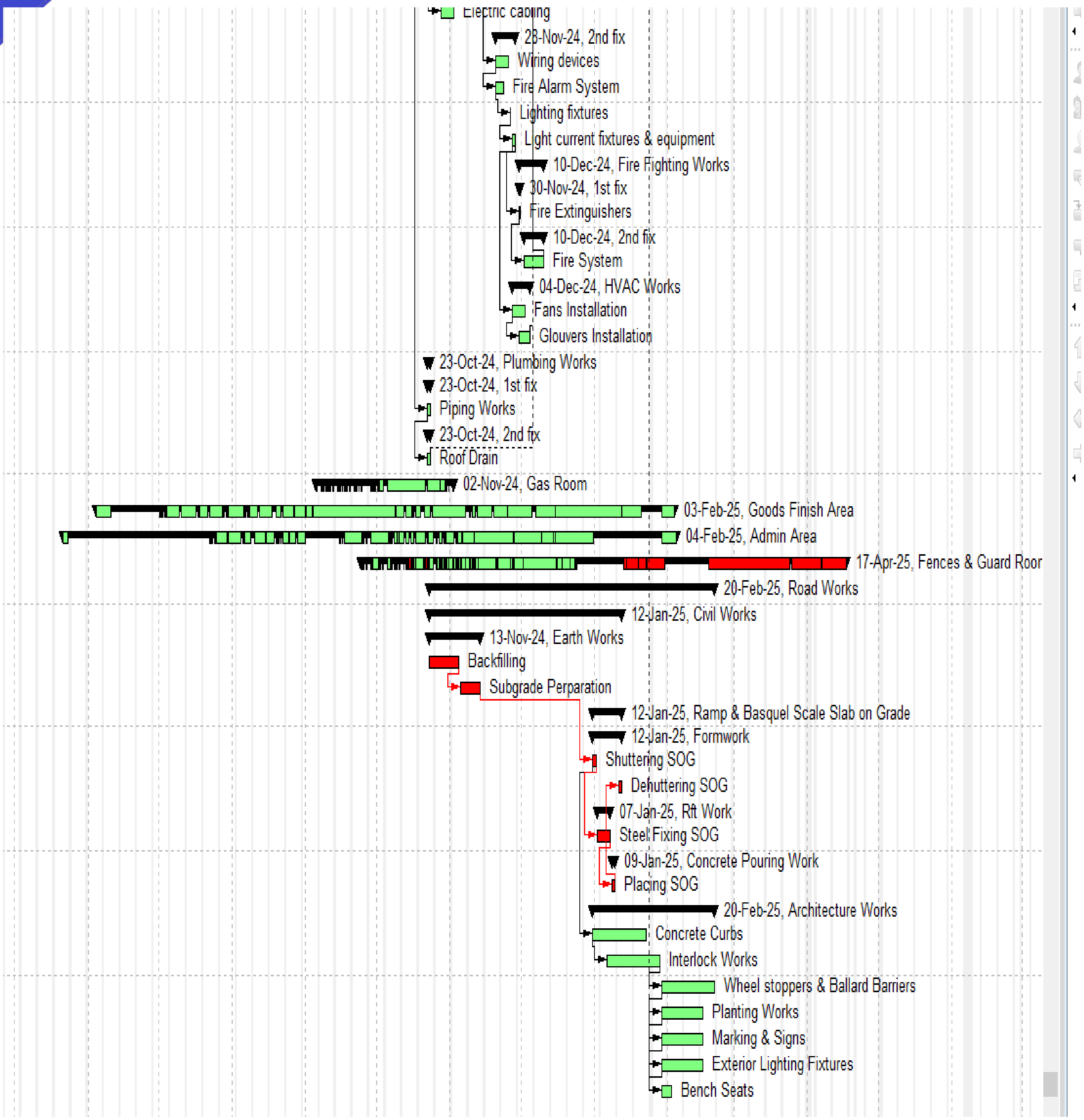
Finishing Works								
Masonry Works								
	Masonry Works	1235	m2	1 charge hand civil+4 mason general+2 semi skilled labourers+2 unskilled labour	15	7	11.76	12
Sandwich Panels Works								
	Sandwich Panels Fixation	8000	m2	1 in charge + 4 fixers + 4 helpers	100	2	40.00	40
Aluminum & Metal Works								
	Facade Aliminum	-	m2	5 Skilled Labor	-	-	5.00	5
	Aliminum Doors	-	Nr	1 skilled + 2 helper	-	-	2.00	2
	Metal Doors	-	Nr	1 skilled + 2 helper	-	-	2.00	2
Painting & Plastering								
	Epoxy Flooring	3375	m2	1 Painter	45	10	7.50	8
	Internal Walls	1235	m2	2 Painters + 1 Helper	60	5	4.12	5

4.4– Gantt Chart




Steel Fixing Walls
18-Sep-24, Concrete Pouring Work
Placing Walls
28-Nov-24, Roof Slab
28-Nov-24, Formwork
Shuttering Roof Slab
Deshuttering Roof Slab
19-Nov-24, Rft Work
Steel Fixing Roof Slab
20-Nov-24, Concrete Pouring Work
Placing Roof Slab
01-Dec-24, Architecture Works
01-Dec-24, Metal Works
Metal Doors and Opennings
12-Oct-24, Insulation
Internal Insulation
Water Test
External Insulation
11-Nov-24, MEP Works
11-Nov-24, 1st fix
Pipings & Fittings
Pumps Installation
29-Oct-24, 2nd fix
Ventilation System
Electrical first fix
Light Current first fix
Electrical Cables
07-Nov-24, Phase 3
Fire Alarm System
Fire Extinguishers
25-Dec-24, Electric Room
17-Oct-24, Civil Works
21-Sep-24, Earth Works
Excavation
Backfilling
17-Oct-24, Concrete Works
14-Sep-24, Foundation
14-Sep-24, Formwork
Shuttering PC Footing
Deshuttering PC Footing
Shuttering RC Footing
Deshuttering RC Footing
11-Sep-24, Rft Work
Steel Fixing RC Footing
12-Sep-24, Concrete Pouring Work


12-Sep-24, Concrete Pouring Work
Placing PC Footing
Placing RC Footing
18-Sep-24, RC Columns
18-Sep-24, Formwork
Shuttering RC Columns
Dehuttering RC Columns
15-Sep-24, Rft Work
Steel Fixing RC Columns
17-Sep-24, Concrete Pouring Work
Placing RC Columns
19-Sep-24, Foundation Insulation
Foundation Insulation
17-Oct-24, Roof Slab
17-Oct-24, Formwork
Shuttering Roof Slab
Deshuttering Roof Slab
09-Oct-24, Rft Work
Steel Fixing Roof Slab
10-Oct-24, Concrete Pouring Work
Placing Roof Slab
03-Oct-24, Slab on Grade
03-Oct-24, Formwork
Shuttering SOG
Dehuttering SOG
23-Sep-24, Rft Work
Steel Fixing SOG
24-Sep-24, Concrete Pouring Work
Placing SOG
25-Dec-24, Architecture Works
20-Oct-24, Masonry Works
Masonry Works
21-Oct-24, Insulation
Roof Insulation
25-Dec-24, Painting & Plastering
Internal Ceiling
Walls
Floor
Facade
10-Dec-24, MEP Works
28-Nov-24, Electrical Works
19-Nov-24, 1st fix
Electrical first fix
Light current first fix
Light current cables
Electric cabling


Electric cabling
28-Nov-24, 2nd fix
Wiring devices
Fire Alarm System
Lighting fixtures
Light current fixtures & equipment
10-Dec-24, Fire Fighting Works
30-Nov-24, 1st fix
Fire Extinguishers
10-Dec-24, 2nd fix
Fire System
04-Dec-24, HVAC Works
Fans Installation
Glouvers Installation
23-Oct-24, Plumbing Works
23-Oct-24, 1st fix
Piping Works
23-Oct-24, 2nd fix
Roof Drain
02-Nov-24, Gas Room
03-Feb-25, Goods Finish Area
04-Feb-25, Admin Area
17-Apr-25, Fences & Guard Roor
20-Feb-25, Road Works
12-Jan-25, Civil Works
13-Nov-24, Earth Works
Backfilling
Subgrade Perparation
12-Jan-25, Ramp & Basquel Scale Slab on Grade
12-Jan-25, Formwork
Shuttering SOG
Dehuttering SOG
07-Jan-25, Rft Work
Steel Fixing SOG
09-Jan-25, Concrete Pouring Work
Placing SOG
20-Feb-25, Architecture Works
Concrete Curbs
Interlock Works
Wheel stoppers & Ballard Barriers
Planting Works
Marking & Signs
Exterior Lighting Fixtures
Bench Seats

Chapter (5)

Cost Estimate

Chapter 5 : Cost Estimate

5.1–Cost Estimate

Introduction:

Cost estimation stands as a pivotal process within project management, offering a meticulously calculated projection of financial requirements essential for project execution. Beyond its numerical essence, it epitomizes the bedrock of project cost management, orchestrating the delicate interplay of planning, monitoring, and fiscal oversight.

It embodies a fusion of quantitative analysis and strategic acumen, sculpting the fiscal framework upon which projects are methodically executed and optimized for success.

Steps of Cost Estimation:

1. Quantity Calculation: Begin by accurately calculating the quantity of materials required based on dimensions from project drawings, factoring in waste percentage to ensure precision.
2. Activity Duration: Calculate the duration of each project activity by dividing the quantity of materials by the production rate, providing insights into the timeline required for completion.
3. Unit Price Acquisition: Procure unit prices of materials from trusted suppliers to establish a baseline for cost estimation.

4. Labor and Equipment Costs: Obtain cost estimates for labor and equipment rental on a per-day basis, essential components for accurate cost projection.
5. Material Cost Calculation: Multiply the quantity of materials by their respective unit costs to derive the total material cost, a pivotal step in the estimation process.
6. Labor and Equipment Cost Determination: Multiply the cost of labor and equipment by the duration of each activity in days, yielding the total labor and equipment cost for the project.
7. Total Direct Cost Computation: Summate the total material cost, labor cost, and equipment cost to arrive at the comprehensive total direct cost of the project activity.

5.2–Project Resources:

1. Labor
2. Material
3. Equipment
4. Sub-Contractors

Some Resources Costing:

Resource	Cost (LE/day)	Cost (LE/hour)
Excavator	4500	562.5
Truck	3500	437.5
Loader	4500	562.5
Compactor	1500	187.5
Vibrator	150	18.75
Driver	300	37.5
Labor	250	31.25
Helper	150	18.75
Foreman	250	31.25

5.2.1Calculation of Direct Cost for Activities:

Earthwork:

Element	Quantity (m3)	Labor (EGP/Day)	Material (EGP/m3)	Equipment (EGP/Day)	Direct Cost
Excavation	9200	1200		15000	496,800
Backfilling	20230	2200		17500	797,062

In excavation: 1 Loader +1 Excavator + 1Trucks + 2Drivers

In Backfilling: 4Labor+ 4Drivers + 2loader+ 1compactor + 2trucks

P.C Footing:

Element	Quantity (m3)	Labor (EGP/Day)	Material (EGP/m3)	Equipment (EGP/Day)	Direct Cost
Shattering	235	400			94,000
Pouring	235	500	1900	150	471,958
DE. Shattering	235	400			94,000

Direct cost of P.C Footing.

R.C Footing:

Element	Quantity (m3)	Labor (EGP/m3)	Material (EGP/m3)	Equipment (EGP/m3)	Direct Cost
Shattering	930	400			372,000
Reinforcement	93	1500	38,000		3,673,500
Pouring	930	500	2500	150	2,929,500
DE. Shattering	930	400			372,000

Direct cost of R.C Footing.

Steel Structure Cost:

Steel Structure Cost			
Location	Quantity (tons)	Price Supply and Apply /ton	Cost
Production Hall Production Hall	230	80000 EGP	18400000
Labors Building Labors Building	24		1920000
Goods Finish Area	75		6000000
Admin Area	41		3280000

5.3–Cash Flow & Overdraft Analysis:

Cash flow analysis and overdraft analysis stand as critical phases in the planning and controlling stages.

Upon finalizing the project duration and allocating resources with their corresponding unit rates to each activity, the contractor gains insight into the monthly direct costs.

These costs serve as the foundation upon which the contractor integrates indirect expenses and site overheads, culminating in the determination of total monthly expenses. Concurrently, the integration of an S-curve enhances this process, providing a graphical representation of expenditure distribution over time, thereby enriching the contractor's ability to monitor and manage project cash flows efficiently.

1) Advanced payment:

The Employer will pay an advanced payment equal to 10% of the contract price when starting to carry out work on the site.

2)Cashin:

Will be paid every month according to the progress of work.

3)Retention:

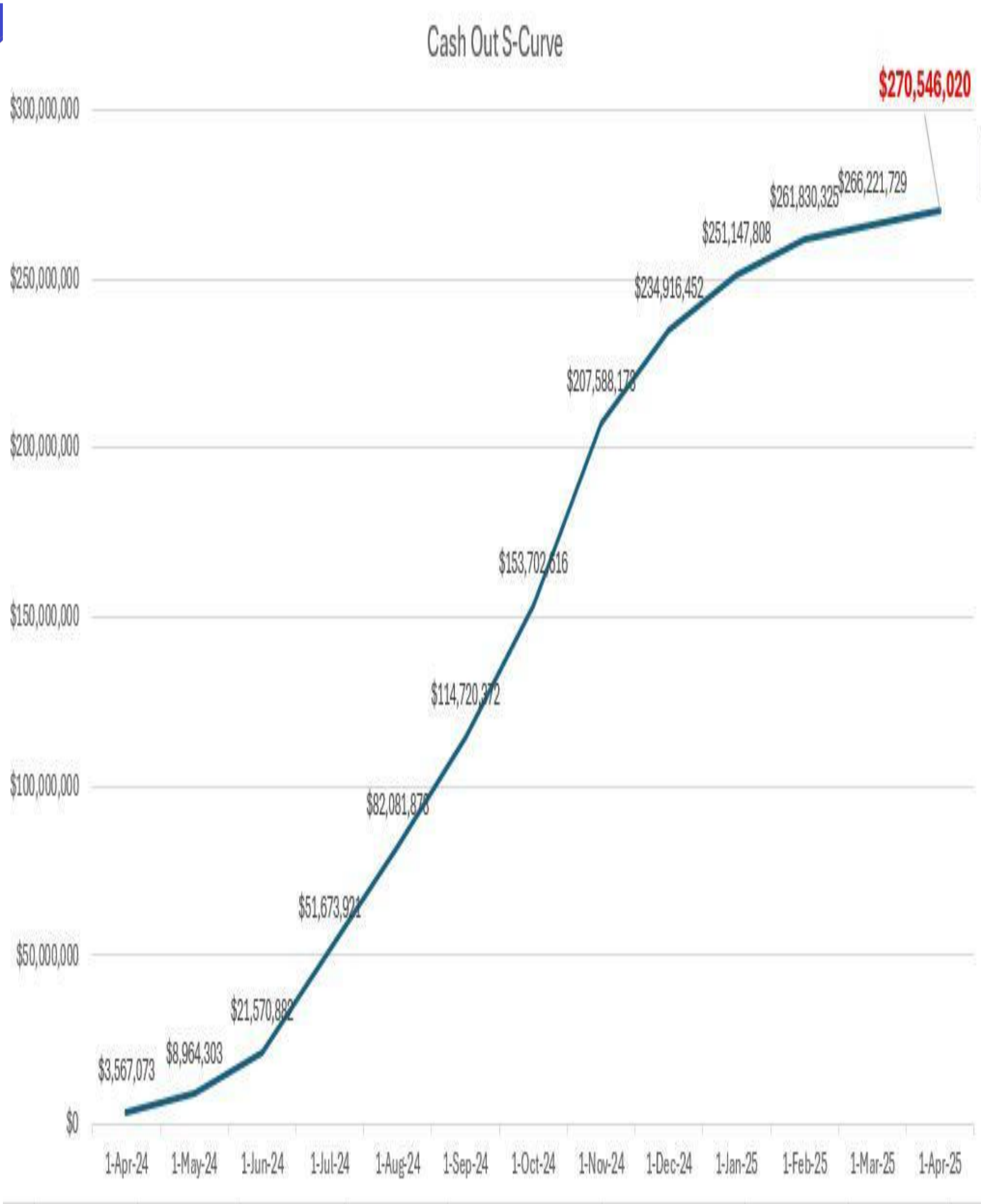
5% of the value of the cash in payment

5.3.1Cost Breakdown

Direct Cost			225,546,020
Indirect		15%	33,831,903
Overheads		5%	11,277,301
Direct + Indirect =			270,655,224
Contingency		1.02%	2,751,570
After Adding Contingency			273,406,794
Adding Profit		5%	13,670,340
VAT		5%	13,670,340
Price			300,000,000

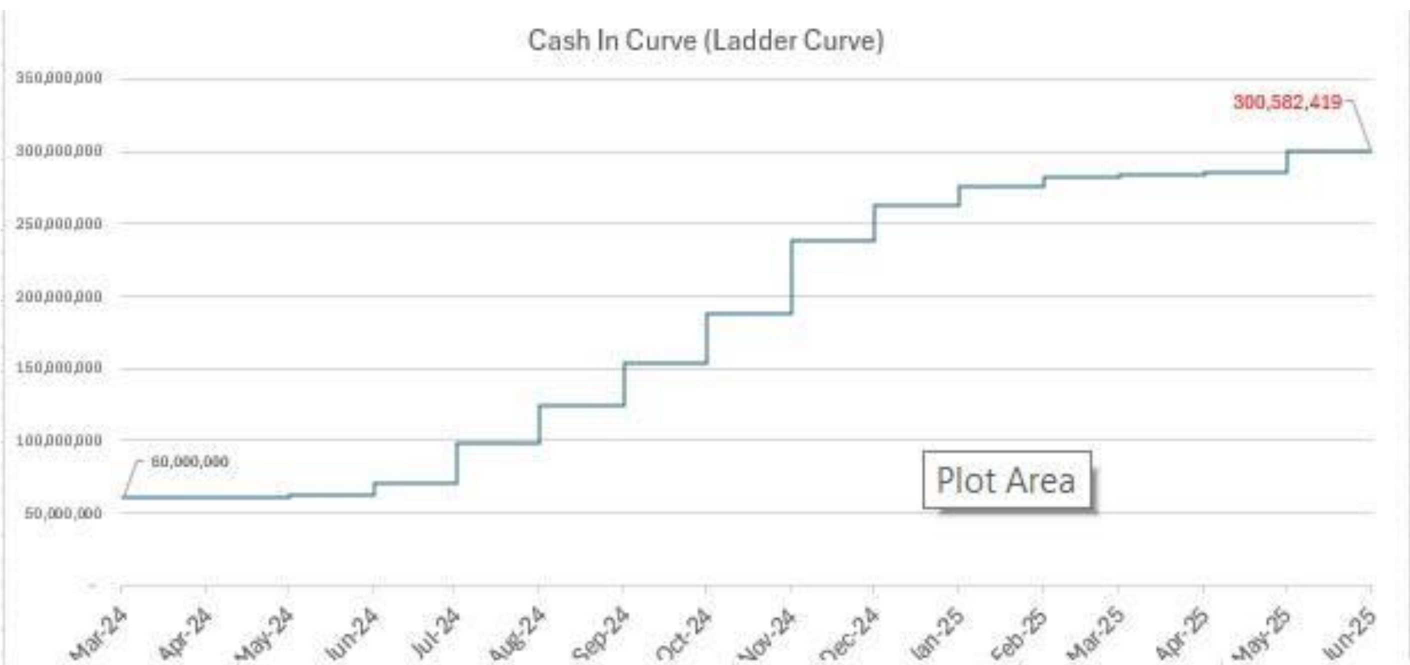
Cash out

Month	Cash. Out	Cumulative Cash Out
1-Apr-24	3567073	3567073
1-may-24	5397230	8964303
1-jun-24	12606579	21570882
1-jul-24	30103039	51673921
1-aug-24	30407952	82081873
1-sep-24	32638498	114720372
1-oct-24	38982245	153702616
1-nov-24	53885556	207588173
1-dec-24	27328279	234916452
1-jan-25	16231357	251147808
1-feb-25	10682516	261830325
1-mar-25	4391405	268388858
1-apr-25	4324290	271108494

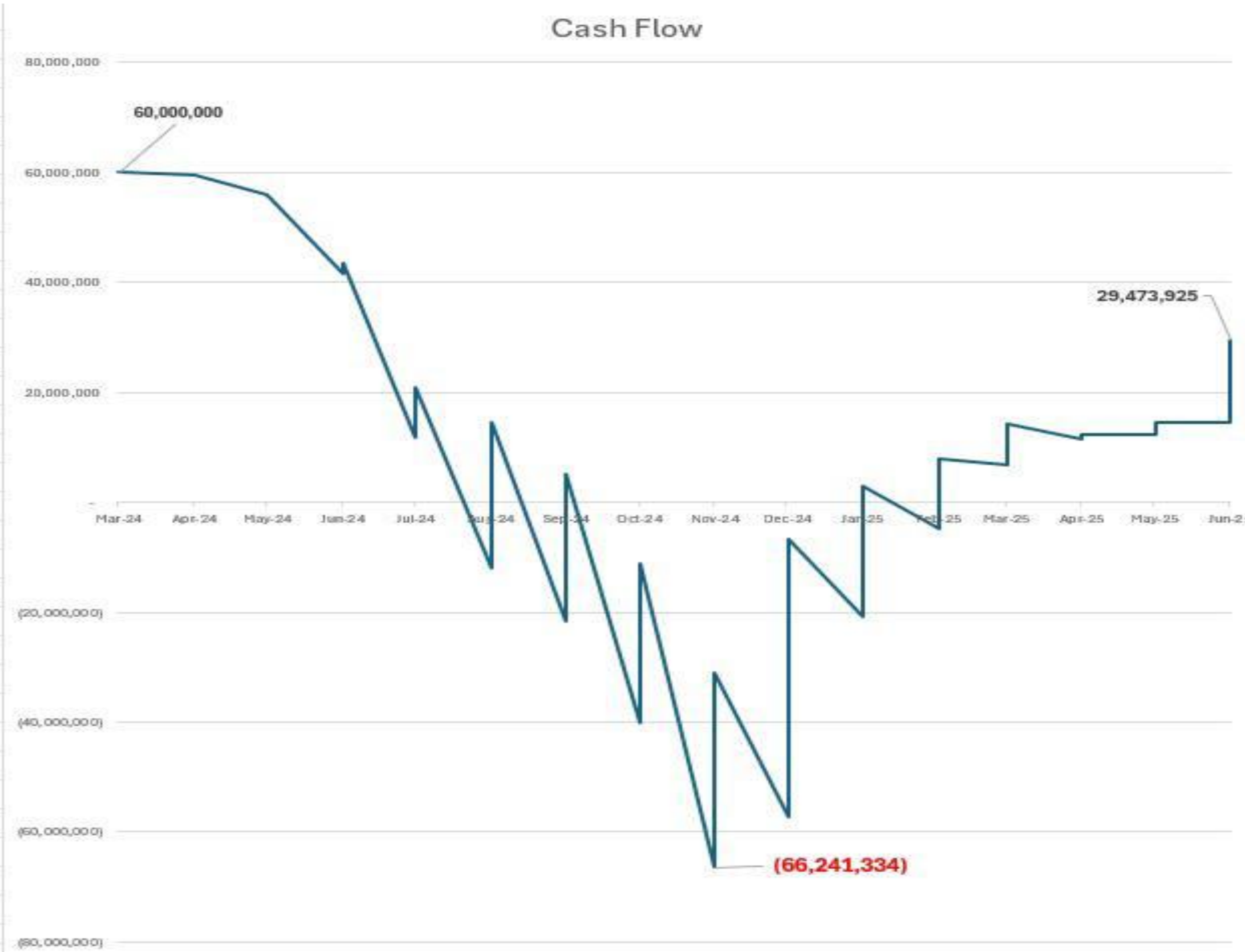

Cash Out S-Curve
$270,546,020
$300,000,000
$250,000,000
$200,000,000
$150,000,000
$100,000,000
$50,000,000
$0
$3,567,073
$8,964,303
$21,570,882
$51,673,921
$82,081,876
$114,720,372
$153,702,616
$207,588,173
$234,916,452
$251,147,808
$261,830,325
$266,221,729
1-Apr-24
1-May-24
1-Jun-24
1-Jul-24
1-Aug-24
1-Sep-24
1-Oct-24
1-Nov-24
1-Dec-24
1-Jan-25
1-Feb-25
1-Mar-25
1-Apr-25

5.3.2 Cash in:

			Contract Selling Price	300,000,000	Selling Price / Direct Cost=	1.33			
			20% of Dircet Cost	Direct Cost + Indirect Cost	1.33 * Direct Cost				
		Direct Cost	Indirect Cost	Total Cash Out	Invoice	Advanced Payment Reduction [20% of invoice]	Retention [5% of Invoic	Monthly Cash	Cum Cash In
Mar-24	Month 0	$0	$0	$0	$0	$0	$0	**$60,000,000**	**$60,000,000**
Apr-24	Month 1	$0	$366,031	$366,031	$0	$0	$0	$0	$60,000,000
May-24	Month 2	$1,830,157	$1,807,901	$3,638,058	$2,440,209	$488,042	$122,010	$0	$60,000,000
Jun-24	Month 3	$9,039,505	$5,279,754	$14,319,259	$12,052,673	$2,410,535	$602,634	$1,830,157	$61,830,157
Jul-24	Month 4	$26,398,771	$5,368,176	$31,766,947	$35,198,361	$7,039,672	$1,759,918	$9,039,505	$70,869,662
Aug-24	Month 5	$26,840,879	$5,814,285	$32,655,164	$35,787,839	$7,157,568	$1,789,392	$26,398,771	$97,268,433
Sep-24	Month 6	$29,071,425	$7,055,595	$36,127,020	$38,761,900	$7,752,380	$1,938,095	$26,840,879	$124,109,312
Oct-24	Month 7	$35,277,976	$10,091,136	$45,369,112	$47,037,301	$9,407,460	$2,351,865	$29,071,425	$153,180,737
Nov-24	Month 8	$50,455,678	$4,724,802	$55,180,480	$67,274,237	$13,454,847	$3,363,712	$35,277,976	$188,458,713
Dec-24	Month 9	$23,624,011	$2,532,857	$26,156,868	$31,498,681	$6,299,736	$1,574,934	$50,455,678	$238,914,391
Jan-25	Month 10	$12,664,283	$1,477,967	$14,142,250	$16,885,711	$3,377,142	$844,286	$23,624,011	$262,538,402
Feb-25	Month 11	$7,389,833	$137,427	$7,527,260	$9,853,111	$1,970,622	$492,656	$12,664,283	$275,202,685
Mar-25	Month 12	$687,136	$453,273	$1,140,409	$916,181	$183,236	$45,809	$7,389,833	$282,592,518
Apr-25	Month 13	$2,266,364	$453,273	$2,719,637	$3,021,819	$604,364	$151,091	$687,136	$283,279,654
May-25	Month 14							$2,266,364	$285,546,018
Jun-25	Month 15							**$15,036,401**	**$300,582,419**

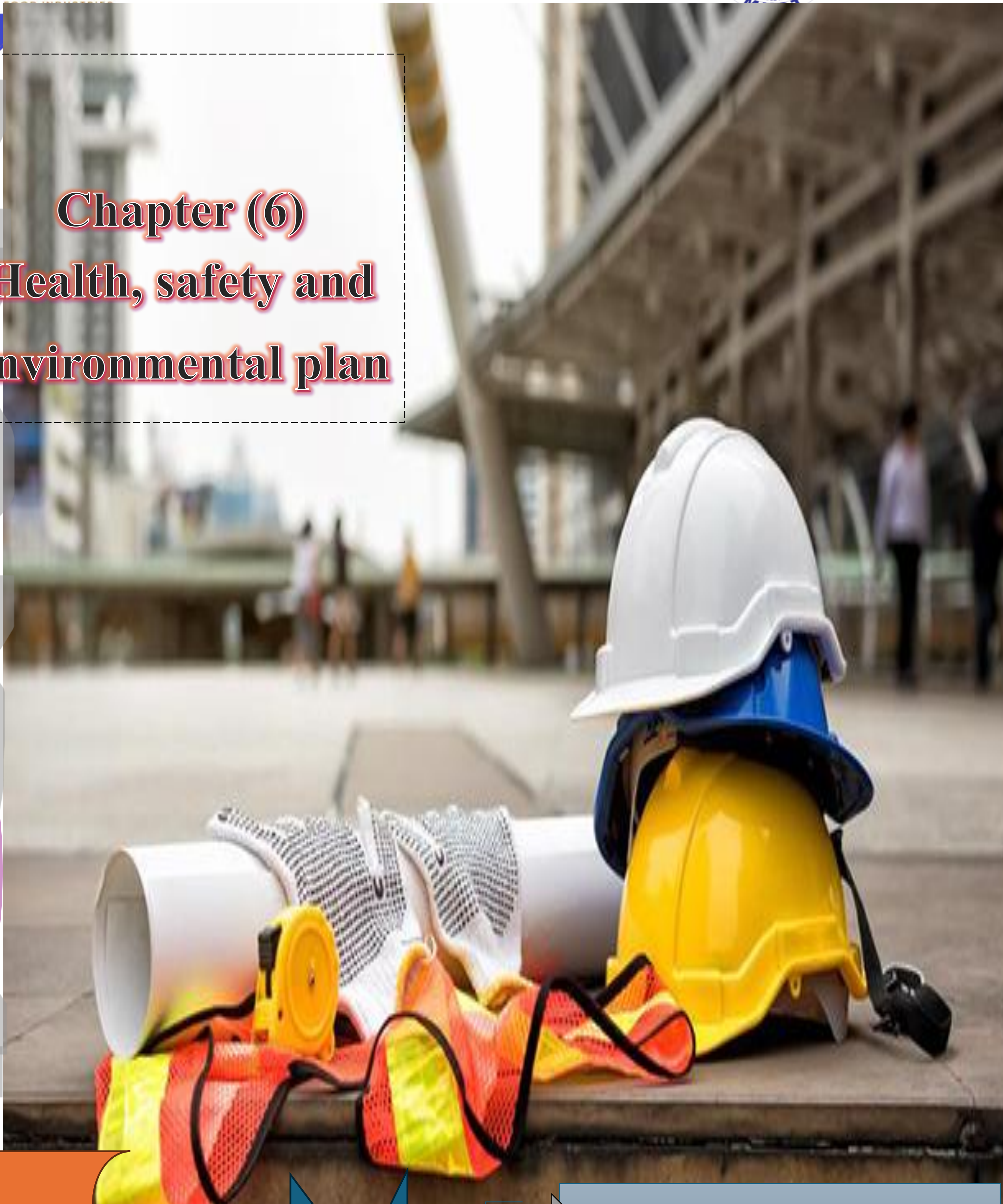


5.3.3 Cashflow:



5.3.4 Overdraft:

Taking a Loan with overdraft value that equals 66241334.4 Then Bank Interset Charges will be 11205825.74Then, we will add this bank charges to our price during tender phase New Contract Price= 311205826. New Selling Price / Direct Cost Factor=1.38 .



Chapter (6)
Health, safety and environmental plan

Chapter:6 Health, safety and environmental plan

6.1-Introduction

The health, safety and welfare of all personnel working on the Site, the safety of the general public

and the avoidance of damage to property are of paramount importance to the Employer. The

Contractor shall treat health and safety measures throughout the Project as the top priority in all

activities and shall ensure that all operations are conducted in such a manner, as to eliminate or

reduce to an acceptable level, the risks to persons, property and equipment. The Contractor shall be

responsible for health and safety during the Execution of the Works. This responsibility shall extend

to the Contractor's Personnel, the Engineer's Personnel, the public and all persons directly or

indirectly associated with the Works.

6.2. 🛡 Health, Safety, and Environment (HSE) Policy

Koning Food Industries

Koning Food Industries is committed to carrying out the construction of its new facility in accordance with the highest standards of health, safety, and environmental protection. Our goal is to ensure the safety of all individuals on-site and to prevent any harm to the environment or surrounding property.

All necessary and reasonable precautions will be implemented promptly to mitigate risks associated with construction activities, such as excavation, concrete works, steel structure installation, heavy equipment operations, and material handling. The company will strictly comply with all applicable local laws, international standards, and regulations issued by relevant authorities, including the National Defense Council.

🎯 HSE Objectives:

- Ensuring the commitment of management, employees, and contractors to health, safety, and environmental protection at every stage of the project.
- Integrating HSE principles with key project activities such as scheduling, quality control, and cost management.
- Ensuring safe handling, storage, and transportation of all construction materials, tools, and equipment.
- Establishing secure and well-managed temporary facilities (e.g., workshops, site offices, storage areas).
- Minimizing environmental pollution (dust, noise, waste) and promoting efficient use of energy and resources.
- Maintaining open communication with all stakeholders on-site and responding to any concerns related to health, safety, or the environment.
- Implementing a robust HSE Management System with regularly reviewed objectives and continuous improvement.

Our Commitments During the Construction Phase:

- Zero accidents
- No harm to any individual
- No negative impact on the environment

HSE Management System

Koning Food Industries – Construction Phase

Koning Food Industries has developed a comprehensive HSE Management System tailored for construction phase of its new factory. This system ensures that all health, safety, environmental risks are identified, assessed, and effectively controlled throughout all project stages.

The HSE Management System Includes:

- Identifying hazards related to excavation, lifting operations, structural work, welding, working at heights, and electrical installations.
- Implementing control measures to eliminate or mitigate risks and ensure a safe working environment for all personnel.
- Preventing environmental damage during construction activities by managing dust, noise, emissions, and construction waste.
- Providing adequate leadership, supervision, and resources (training, PPE, emergency response tools) to support HSE implementation.
- Appointing a dedicated HSE Officer or Safety Engineer to oversee compliance, conduct inspections, and monitor daily operations.
- Maintaining current knowledge of site activities and anticipating potential HSE issues before they arise.
- Leading investigations in case of serious incidents , ensuring corrective actions are taken.
- Ensuring that the HSE Plan applies to all parties on-site, including subcontractors, labor teams, suppliers, and engineers.

6.3 – Organization and Responsibilities

This section outlines how Health, Safety, and Environment (HSE) efforts are managed during the construction phase of Koning Food Industries Steel Factory, describing general HSE responsibilities of all personnel involved in the project.

All personnel must, at a minimum:

- Perform their tasks safely to prevent accidents, environmental damage, or property loss.
- Actively participate in HSE awareness sessions and meetings.
- Understand the HSE Policy and their specific responsibilities.
- Be aware of HSE objectives and performance targets.
- Receive training as required by the HSE Management Plan.
- Avoid unsafe work practices and immediately report hazards or unsafe conditions.

a) Project Manager

- Serve as a visible and proactive leader for HSE throughout the construction site.
- Develop and implement HSE Execution Plans aligned with construction activities and timelines.
- Ensure that all necessary resources such as training, equipment, and PPE are available and effectively utilized.
- Assign clear HSE responsibilities and set measurable objectives for site teams and subcontractors.
- Ensure all site operations comply with HSE policies and applicable legal requirements.

b) HSE Manager

- Provide expert guidance on all HSE matters and ensure compliance with relevant laws and standards.
- Monitor and report on overall HSE performance at the construction site.
- Organize and oversee HSE training programs for all personnel.
- Lead incident investigations and recommend corrective actions.
- Coordinate regular safety inspections across all site areas.

c) Site Manager

- Ensure risk assessments and permits to work are completed prior to commencing any construction or maintenance activities.
- Communicate all HSE policies and procedures clearly to site workers and contractors
- Develop action plans to improve safety performance in all site areas, including storage and assembly zones.
- Manage site access control and enforce hygiene and safety zones.
- Oversee regular maintenance of machinery and equipment to meet HSE standards.
- Ensure proper receipt, inspection, and storage of materials and equipment per safety and quality requirements.
- Promptly address all reported hazards or near misses.
- Maintain clean, safe, and hazard-free working environments throughout the site.
- Ensure all workers correctly use Personal Protective Equipment (PPE).
- Implement measures to control noise, dust, and other environmental impacts during construction.
- Maintain updated documentation of all risk assessments and review them regularly.

d) HSE Officer

- Conduct routine inspections throughout the construction site, including storage and loading areas.
- Prepare daily safety inspection checklists and ensure their availability for audits.
- Investigate accidents and near misses according to company procedures and client expectations.
- Verify that all lifting equipment and vehicles comply with regulatory and client requirements.
- Support and assist site management in enforcing HSE policies.

e) HSE Engineer

- Carry out detailed HSE inspections and audits to ensure continuous compliance.
- Assist in preparing reports on safety performance and improvement plans.
- Participate in safety meetings and contribute technical expertise on risk mitigation.
- Monitor implementation of safety controls and equipment maintenance.

6.4 – HSE Organizational Breakdown Structure (OBS)

The HSE OBS at Koning Food Industries Steel Factory defines clear roles and responsibilities to maintain safety and environmental compliance across all construction activities. Key positions may include:

- HSE General Manager
- HSE Manager
- HSE Training Coordinator
- Quality & Environmental Advisor
- Waste Management Officer
- PPE Compliance Supervisor
- Medical and First Aid Coordinator

Each member is critical in ensuring effective HSE management throughout the construction project.

6.5 – HSE Leadership

a) Project HSE Commitment

Koning Food Industries commits to:

- Complying with all applicable health, safety, environmental, and labor regulations relevant to construction activities.
- Providing a safe and clean work environment that prevents accidents, injuries, and environmental damage.
- Protecting all workers, contractors, and operations from health risks and external threats.
- Continuously identifying, assessing, and mitigating environmental and occupational risks during construction.

b) HSE Goals and Targets

Our primary goal is:

"Zero accidents, zero harm to people, zero environmental damage."

To achieve this, Koning Food Industries will:

- Identify and control HSE hazards in all construction, material handling, and logistics activities.
- Integrate HSE requirements into all project phases and teams, including design and engineering.
- Set and communicate clear HSE objectives to all departments and subcontractors.
- Demonstrate strong HSE leadership by clearly defining roles, responsibilities, and performance targets.

6.6 – HSE Performance Review

A) Performance and Measurement

Koning Food Industries will set annual HSE performance targets to promote safety and environmental responsibility across all departments involved in the construction project. Supervisors and department heads are responsible for ensuring their teams meet these targets.

Monthly HSE performance reviews will include:

- Performance against established targets
- Review of incidents and safety trends
- Evaluation of departmental compliance with HSE policies
- Lessons learned and improvement plans
- Corrective actions and risk control measures

6.7 – HSE Reports

Koning Food Industries will conduct daily HSE inspections across all sections of the construction site. All incidents, unsafe acts, and equipment defects must be reported immediately to supervisors.

Reporting is required for:

- Fatal injuries or serious accidents
- Medical cases resulting in lost work time
- Property or equipment damage
- Environmental harm or contamination
- Fires or critical near misses

For severe incidents, immediate verbal notification must be given to top management followed by a written report within 24 hours.

HSE records will include logs of:

- Workplace injuries
- Fires and safety breaches
- Property or machinery damage
- Near misses in production or loading areas
- Vehicle accidents and unsafe lifting operations

Reports must be available for inspection and shared monthly with the Safety Committee. Emergency contact numbers will be posted throughout the site.

The HSE team will also track waste handling, hazardous material reporting, and ensure all data is regularly reviewed by the Safety Committee.

Incident/Accident Reporting, Investigation and Corrective Action

All accidents or near misses must be reported immediately. The HSE department will investigate all incidents and document findings for review and prevention. In serious cases, emergency contacts will be notified and detailed reports submitted within 24 to 72 hours.

B) Accident Investigation

- Prevent recurrence by identifying root causes
- Determine point of failure or procedure deviation
- Recommend corrective actions to avoid reoccurrence

C) Accident Investigation Guidelines

- Interview injured workers and eyewitnesses
- Inspect equipment or site layout for misuse or damage
- Evaluate work procedures for gaps or errors
- Prepare diagrams and collect photographic evidence
- Document findings and implement improvements

6.8 – Hazard Risk Management

A) Hazard Identification, Risk Assessment, and Control

Koning Food Industries applies a structured risk management system including:

- Identification of hazardous activities or equipment
- Assessment of potential consequences and likelihood
- Implementation of risk controls to maintain exposure at acceptable levels

Hazard Identification

Includes audits, inspections, employee feedback, incident reporting, and task analysis.

Risk Evaluation

Each hazard is assessed based on severity and probability to determine its risk rating.

B) Managing Risks to Acceptable Levels

Management will apply corrective actions based on severity and likelihood, even if no incident has yet occurred.

C) Risk Review and Verification

Risks will be periodically reviewed by qualified personnel, especially when changes to processes or designs occur.

A) Risk Assessment Matrix

HAZARD EFFECT SEVERITY

PROBABILITY	1 VL	2 L	3 M	4 H	5 VH
5 H	5	10	15	13	15
3 M	3	6	9	12	14
1 L	1	2	3	10	11

Table: Probability (P) Rating

Rating	Probability (P)
H	Event likely to occur more than once per quarter
M	Event likely to occur at least once in six months
L	Event likely to occur less than once per year

Hazard Effect Control Actions

RISK FACTOR	CONTROL ACTIONS
9 - 15	PLAN CONTROLS TO REDUCE RISK FURTHER. ASSESS PRIORITY AND AGREE IMPLEMENTATION TARGETS WITHIN 07 DAYS IMMEDIATE ACTION, TASK MUST NOT PROCEED, SERIOUS LOSS POTENTIAL TASK MAY PROCEED ONLY WITH ADDITIONAL CONTROLS IN PLACE TO AVOID SERIOUS LOSS
5 - 10	IMPLEMENT CONTROLS TO REDUCE RISK TO LOWEST LEVEL REASONABLY PRACTICABLE WITHIN 03 MONTHS MAXIMUM MONITOR PROCEDURES AND CONTROLS TO ENSURE RISK IS MAINTAINED AS LOW AS REASONABLY PRACTICAL. TAKE IMMEDIATE ACTION IF STANDARDS ARE NOT MET. ENSURE ADDITIONAL CONTROLS IMPLEMENTED WITHIN ONE MONTH.
1 – 3	MONITOR TO ENSURE RISK DOES NOT INCREASE PREPARE PLAN TO REDUCE RISK TO LOWEST LEVEL REASONABLY PRACTICABLE. ACTION WITHIN ONE-YEAR MAXIMUM.

6.9-Safety Risks Control Actions

4.1 Risk Assessment in Food Manufacturing Activities

Activity	Unmitigated Risk (P E R C)	Evaluation Risk After Control (P E R C)
Mixing Raw Materials	2 3 6	Provide dust masks, use enclosed mixers, and ensure allergen control training is given.
Packaging Line Operation	3 2 6	Install guards on machinery, provide PPE gloves, train operators on emergency stop protocols.
Warehouse Loading	3 3 9	Ensure proper floor marking, immediate spill response, use anti-slip footwear.
Forklift Use	4 3 12	Certified operators only, marked travel paths, regular maintenance and speed limits.

Job Safety Analysis (JSA)

The Job Safety Analysis is a step-by-step review of specific tasks within the steel factory operations at Koning Food Industries, aiming to identify potential hazards associated with each step and eliminate or control them.

JSA Sequence:

1. Identify and Select the Job

   When selecting the job, consider:

   - Frequency of accidents related to the task (e.g., worker injuries or equipment malfunctions).
   - Severity of past incidents (serious injuries, fire hazards, major equipment failure).
   - Potential risk even without incident history, especially for frequently performed tasks.
   - Introduction of new equipment with unknown risks.
   - Tasks with high consequences if failed (e.g., welding, heavy lifting).
   - Repetitive tasks causing ergonomic strain.
   - Non-routine tasks such as temporary maintenance or testing.

2. Define the Scope

   Define the job scope precisely (e.g., operating the steel cutting machine or maintaining the overhead crane).

3. Identify Steps

   Break the job into logical steps and describe each step clearly, e.g., “Load steel sheet onto conveyor,” “Activate cutting machine,” “Secure cut pieces.”

4. Select Employee and Observe Job Steps

   Observe a trained employee performing the task, emphasizing that the purpose is to improve safety, not to evaluate performance.

5. Identify Hazards and Risks

   Identify all potential hazards: mechanical (cuts, burns, falls), chemical (exposure to lubricants or cleaning agents), environmental, and ergonomic (muscle strain).

6. Develop Solutions

   Control risks by applying one or more of the following:

   - Engineering controls (machine guards, emergency stop systems).
   - Process changes to reduce exposure time or frequency.
   - Substitution of hazardous materials with safer alternatives.
   - Training and use of appropriate Personal Protective Equipment (PPE).

7. Check Availability of Related Working Procedures

   Ensure Standard Operating Procedures (SOPs) exist for the task or develop them based on the JSA.

8. Review Amended Working Procedures

   Discuss any changes with employees to confirm practicality and understanding.

9. Update the JSA

   Revise whenever procedures change, new equipment is introduced, or incidents occur.

6.10 – HSE Management Plan

a) Work Activity Planning

Koning Food Industries' safety policy is "No harm to people and no accidents." Everyone working for or on behalf of the company is responsible for their safety and the safety of others.

Golden Rules of Safety:

1. Permit to Work
2. Energy Isolation
3. Equipment Maintenance
4. Factory Machinery Safety
5. Working at Heights
6. Lifting Operations
7. Driving Safety
8. Management of Change

- No work shall proceed without a pre-job risk assessment and safety briefing appropriate to the level of risk.
- All personnel shall be trained and competent in their tasks.
- PPE shall be worn according to risk assessment and site requirements.
- Emergency response plans must be in place prior to starting work.
- Everyone has the right and obligation to report or STOP unsafe work, with a clear reporting protocol.

b) Project Orientation

The HSE team will develop and implement a project orientation for all new personnel covering:

- Project goals and organization
- HSE management system overview
- Emergency response and incident reporting procedures

c) Visitor Orientation

All personnel, including visitors, must receive a Visitor Orientation before entering the facility. This will include:

- Emergency exits and alarm systems
- Muster points
- Emergency procedures and contact numbers

Visitor orientation programs will be regularly maintained and updated.

6.11– HSE Training

Effective HSE training is essential to achieving an accident and injury-free workplace. Training programs at Koning Food Industries include:

- HSE Induction
- Supervisory Safety Courses
- Emergency Response Training
- Task-Based Risk Assessment
- Work Control Procedures
- Environmental Awareness
- Incident Reporting
- First Aid
- Defensive Driving
- Lifting Operations
- Confined Space Safety (if applicable)

6.12– HSE Meetings

HSE meetings will include but are not limited to:

- Weekly HSE meetings with production and maintenance teams
- Participation in client HSE meetings (if required)
- Toolbox talks focusing on workplace safety
- Accident and incident investigation meetings

Scaffolding

- Any work at a height above 1.8 meters in Koning Food Industries must be performed using properly installed scaffolding. The responsible personnel must have prior experience with scaffolding and ensure proper tagging and erection.
- Scaffold structures should include all necessary safety elements: base plates, platforms, ladders, tagging system, handrails, mid-rails, toe-boards, and bracing.
- A work permit must be issued before erecting the scaffold.
- A green tag indicates the scaffold is safe for use; yellow tag means use is allowed with harness and supervision; red tag means unsafe and under construction.
- A scaffold inspection checklist must be prepared, approved, and available on site.

Confined Space

- Confined spaces are areas with limited access or ventilation, such as tanks, silos, hoppers, sumps, ducts, or pits that may exist in food manufacturing settings.
- Hazards may include oxygen deficiency, flammable gases, or toxic chemicals from cleaning agents or fermentation by-products.

General Requirements:

- Entry is allowed only with a Confined Space Entry Permit, valid per shift.
- The space must be cleaned of hazardous materials and gases before entry.
- Testing of the atmosphere (O_2, H_2S, CO, LEL) must be done continuously.
- Workers must wear a safety harness with a lifeline, and a trained stand-by person must always be present.
- No one may enter unless emergency procedures are in place and clearly communicated.

Abrasive Blasting (if applicable)

- Abrasive blasting operations shall be carried out only in designated areas and under controlled conditions.
- Only trained and authorized personnel may perform abrasive blasting.
- Appropriate PPE must be used, including full-body protection, gloves, safety goggles, hearing protection, and respiratory protection.
- Dust extraction or containment systems must be in place to avoid contamination of food processing areas.
- Abrasive materials used must be approved and compatible with factory hygiene standards.
- Blasting operations shall not be conducted near open production lines or during active food processing.
- A blasting permit must be issued and signed by the HSE Manager before the task begins.
- Fire extinguishers must be available at the blasting site.

Mechanical Equipment Safety

- Only trained and certified personnel are permitted to operate mechanical equipment such as forklifts, mixers, conveyors, or packaging machinery.
- Equipment must be inspected daily before use. Faulty or damaged machines must be reported immediately and not operated.
- Safety guards, interlocks, and emergency stops must always be functional and never bypassed.
- Equipment operating zones must be clearly marked, and unauthorized access is prohibited.
- Lockout/Tagout (LOTO) procedures must be applied before maintenance or repair works.
- Any modifications to machinery must be approved by the engineering and HSE departments.
- Operators must wear proper PPE and be aware of emergency shutdown procedures.

Construction Activities and Equipment

- All construction activities at Koning Food Industries (whether inside or outside the facility) must be carried out under proper supervision and with prior risk assessment.
- Only trained and certified operators are allowed to use heavy equipment such as forklifts, boom lifts, or compactors.
- A valid work permit must be issued before any excavation, installation, or external civil activity starts.
- Construction zones must be clearly barricaded and marked with warning signage.
- Equipment must be inspected daily and maintained regularly.
- Spotters or signalers must guide all vehicle movements in tight or congested areas.
- Personal Protective Equipment (PPE) must be worn at all times: safety shoes, high-visibility vest, helmet, gloves, goggles, and hearing protection where needed.

Excavation Safety

- All excavation work must be approved in advance and performed as per the Excavation Permit issued by the HSE department.
- Underground utilities must be identified and marked before excavation begins.
- Excavations deeper than 1.2 meters must have proper shoring
  or sloping to prevent collapse.
- Entry into excavations is only allowed if the site has been inspected and deemed safe.
- Access ladders must be provided for excavations deeper than 1.5 meters.
- Barricades, warning signs, and lighting (if at night) are mandatory.
- Excavation areas must be inspected daily and after rainfall.

Electrical Installation Safety

- All electrical installation work must be performed by certified electricians and supervised by the engineering and HSE departments.
- Lockout/Tagout (LOTO) procedures must be strictly followed.
- Tools and cables must be insulated and fit for industrial use.
- Electrical cabinets must be kept closed and labeled.
- Temporary power connections must be secured and inspected regularly.
- Fire extinguishers (CO2 type) must be placed near installation areas.
- All workers must wear electrical-rated PPE:

  insulated gloves, eye protection, and safety shoes.

Lock Out and Tag Out System

Koning Food Industries shall establish a lock out and tag out system compatible with the factory's safety policies and in line with food manufacturing best practices. This system is vital to ensure safe maintenance, repair, and servicing of machinery used in biscuit and sweets production.

- Every production area has ongoing maintenance needs that can pose hazards to employees if not handled correctly.
- Serious injury can result from sudden, unexpected startup of biscuit or confectionery machines, especially those powered by electrical, pneumatic, or hydraulic energy.
- Machines thought to be turned off may restart automatically due to timers or software systems unless locked out properly.
- Lockout devices such as padlocks and keys must be uniquely numbered and traceable.
- Keys must be stored securely to prevent unauthorized use.
- A spare key for each lock must be kept in secure storage for emergencies only.
- All lockout and tag out procedures shall be implemented under the supervision of the HSE officer using a permit-to-work system.

<u>Step 1: Preparation and Notification</u>

Before servicing equipment:

- Identify the type of energy source (electrical, pneumatic, steam, etc.)
- Recognize related hazards.
- Determine proper isolation methods.
- Notify all relevant production personnel that the machine will be shut down for service.

Step 2: Shutdown the Equipment

- Follow standard shutdown procedures according to manufacturer instructions.
- Ensure all power sources are turned off — note that some machines may have more than one source.

Step 3: Isolate the Equipment

- Turn off main breakers or valves.
- Disconnect plugs or air sources.
- Refer to equipment diagrams to confirm all isolation points (especially mixers, ovens, and conveyors).

Step 4: Attach the Lock and Tag

- Each maintenance employee must attach their lock and tag.
- If multiple workers are involved, group lockout kits shall be used.
- This prevents accidental re-energizing during service.

Step 5: Release Stored Energy

- Ensure no residual energy remains by:
  - Inspecting equipment for movement.
  - Discharging stored electricity.
  - Venting air pressure or steam.
  - Draining any tanks or systems.

Step 6: Test Equipment

- Clear the area.
- Test that machines cannot be turned on.
- Verify valves and breakers are properly isolated.
- Begin maintenance only once energy has been fully controlled.

Welding and Cutting Operations

Welding and cutting activities inside Koning Food Industries shall be strictly controlled due to the fire and injury risks they pose within the food manufacturing environment.

- These activities are only permitted in designated areas or under strict control using a Hot Work Permit system.
- Only trained and certified personnel are allowed to carry out welding or cutting work.
- All work must be authorized and supervised by the HSE officer.
- Prior to starting any job, the surrounding area must be cleared of flammable materials such as packaging, wrappers, or cleaning agents.
- Fire extinguishers must be available within reach of the work zone.
- Continuous fire watch must be maintained for at least 30 minutes after the task is completed.
- Flash screens or barriers must be used to protect nearby workers.
- Adequate ventilation must be ensured to avoid accumulation of fumes or gases.

PPE for Welding and Cutting

All personnel involved must wear the following personal protective equipment:

- Flame-resistant overalls
- Welding helmet with appropriate lens
- Heat-resistant gloves
- Safety shoes
- Respiratory protection if required

Manual Handling – Koning Food Industries

Main Requirements:

- Avoid hazardous manual handling operations as much as possible.
- Assess all manual handling tasks that cannot be avoided.
- Minimize the risk of injury to the lowest practicable level.
- Provide clear information about the loads to be handled.

Avoidance of Manual Handling:

- If there's a risk of injury, consider whether the load needs to be moved at all.
- Smart storage layout and proper delivery planning can reduce handling needs.
- Where handling is essential, mechanical aids (like forklifts or trolleys) should be used.
- These aids must be integrated in the planning phase of production and maintenance tasks.

6.12– Medical and Health Provision

- All employees shall undergo a pre-employment medical exam to ensure fitness for assigned tasks.
- Freelancers working short-term may provide a medical certificate confirming fitness to work.
- Any worker with contagious diseases shall be restricted from entering the site until cleared.
- Health programs like hearing conservation, hazardous materials communication, and respiratory protection will be implemented.
- On-site medical services shall include first aid, ambulance, and treatment arrangements.
- Site communication boards must display emergency contacts and nearest hospital information.
- Potable water (tested and certified) will be available and managed under local health guidelines.
- Waste bins will be provided and emptied regularly according to hygiene standards.
- Food/rest areas will be set away from work zones and maintained in clean condition.
- Toilets (including field toilets) shall be provided at adequate ratios and cleaned.
- Temporary facilities such as site offices, kitchens, and break areas shall meet comfort and safety standards in accordance with local laws.

Alcohol and Drugs

- Use of alcohol and drugs is strictly prohibited at Koning Food Industries.
- Violations can result in:
    - Reduced productivity and poor performance
    - Absenteeism and tardiness
    - Workplace accidents
    - Poor morale and team conflict
    - Negative impact on company image
- The company enforces a strict Drug and Alcohol Abuse Prevention Policy for all employees and subcontractors.

First Aid Facilities

- First aid must be available at all times within the factory.
- Facilities shall be kept clean and include:
    - Telephone
    - Desk
    - Wash basin with hot/cold water
    - Examining table
    - Air conditioning and lighting
- Medical cabinets shall be stocked and overseen by a trained first aider or medical professional.
- A directory with emergency contact numbers must be available in the clinic.
- A fully equipped emergency vehicle (ambulance) must be provided and include:
    - Stretcher and blankets
    - Portable oxygen
    - Fracture splint
    - Bandages and tourniquets
    - Sterile water
- A certified first aider shall always be on-site and trained in coordination with health authorities.

6.13– Emergency

Emergency Response Plan

Koning Food Industries operates with a full Emergency Response Plan (ERP) covering all factory zones and new production lines.

- The ERP shall be updated regularly to reflect process changes and new hazards.
- It includes emergency types, notification flowcharts, responsibilities, communication methods, and contact directories.

Maintenance Procedures

- All critical HSE equipment (emergency shutdown valves, relief valves, alarms, backup power) must be accessible for safe maintenance.
- A maintenance schedule shall be prepared based on manufacturer instructions.
- Preventive maintenance will ensure equipment is functional during any emergency.

Crisis and Emergency Preparedness

- Emergency planning shall include:
  - Roles and responsibilities
  - Communication protocols for internal and external coordination
  - Evacuation, rescue, and medical treatment procedures
  - Environmental protection strategies during emergencies
  - Regular training for emergency response teams.

6.14– Fire Prevention – Koning Food Industries

This section includes all necessary preventive measures to avoid fires and protect the facility, personnel, and materials from fire-related hazards.

- High-risk operations like welding, hot work, and spray painting must be carried out away from flammable materials or within specially protected zones.
- Emergency access and escape routes must be kept clear at all times.
- Plant and machinery must be protected against potential fires, especially if stored near combustible materials.
- Electrical systems and equipment must be regularly inspected for faults and overheating.
- Smoking is allowed only in designated areas.
- Grounding and bonding techniques must be applied wherever static electricity poses a risk.
- Flammable materials must be stored in a fire-compliant warehouse according to their Material Safety Data Sheets (MSDS).
- Flammable liquids must be transported only in closed metal containers — plastic is strictly prohibited.
- Combustible construction materials such as packaging, scaffold planks, wooden forms, rubber, insulation, and fuels must be managed carefully to avoid fire hazards.
- Waste must be removed daily and housekeeping maintained to prevent accumulation of flammable debris.
- Suitable fire extinguishers must be available throughout the site during construction and operation phases.
- All fires, even if extinguished internally, must be reported to the HSE department and client representative.
- The fire protection team must inspect the incident area, give recommendations, and confirm firefighting readiness has been restored.
- A daily end-of-shift inspection must ensure that the facility is left in a fire-safe condition.

6.15– Environmental Protection

- HSE efforts shall fully consider environmental impacts during construction and operation.
- Koning Food Industries will follow environmental protection procedures, including pre-commissioning monitoring, waste management, and pollution prevention.
- Every effort shall be made to avoid harm to people, property, or the environment due to noise, dust, chemical spills, or poor waste control.
- A formal Environmental Management System (EMS) will be implemented, including:
  - Identification and evaluation of environmental aspects
  - Spill prevention and response
  - Waste management
  - Dust and air quality control
  - Noise and vibration control
  - Traffic-related emissions

Inspection and Audit

- The HSE Manager will perform a daily walk-through in all factory zones and maintenance areas to verify compliance with safety rules and safe working conditions.
- Routine joint inspections between HSE, production, and maintenance departments will be conducted regularly to identify hazards and ensure corrective actions.

Daily Walk Around

The HSE Manager at Koning Food Industries shall conduct a daily inspection of production, maintenance, and warehouse areas to ensure compliance with all safety and hygiene regulations.

- Joint inspections between HSE, QA, and Operations shall also be conducted regularly.

6.16– Scope of Inspection:

- Verify proper implementation of HSE rules and standards
- Identify and document violations or unsafe practices
- Define corrective actions and assign deadlines
- Ensure all departments maintain the required safety level

Major Points to Check:

- General housekeeping and cleanliness
- Unsafe acts or hazardous conditions
- Environmental contaminant handling
- Equipment condition and safety protections
- Proper and effective use of PPE
- Readiness of emergency equipment (First Aid, fire extinguishers)
- Compliance with factory safety procedures and work instructions

6.17– Incentive and Disciplinary System

Incentive Program

Koning Food Industries applies a structured incentive system to encourage employee participation in HSE practices:

- Recognition awards for best-performing teams or departments
- Celebrating major HSE milestones on site
- “On-the-spot” HSE recognition for proactive safety actions

Disciplinary Action Program

The factory implements a graduated disciplinary system for violations based on severity and recurrence.

Violation Type	First Offense	Second Offense	Third Offense
Minor Unsafe Act	Verbal Warning	Written Warning	Suspension / Site Removal
Major Unsafe or Disrespect	Immediate Suspension or Removal (no tolerance)	—	—

This system ensures fairness and accountability, while reinforcing the importance of a safe and respectful workplace.

6.18– Safety Checklist

1. JOB SITE INFORMATION

Item	Acceptable	Not Acceptable
Job site warning posters posted		
Scheduled safety meetings held and documented		
Medical services, first aid equipment, stretchers and a qualified first aider available		
Emergency telephone numbers posted (medical services, fire department, police)		

2.HOUSEKEEPING AND SANITATION

Item	Acceptable	Not Acceptable
Working areas generally neat		
Waste and trash regularly disposed		
Enclosed chute provided when material dropped outside building from over 20 feet		
Lighting adequate for all work tasks		
Projecting nails removed or bent over		
Oil and grease removed from walkways and stairs		
Waste containers provided and used		
Disposable drinking cups and container for used cups provided		
Sanitary facilities adequate and clear		

3. FIRE PREVENTION

Item	Acceptable	Not Acceptable
Fire protection program developed		
Fire instructions provided to personnel		
Proper type and number of fire extinguishers, identified, checked and accessible		
Phone number of fire department posted		
"NO SMOKING" signs posted and enforced where needed		

4. ELECTRICAL INSTALLATIONS

Item	Acceptable	Not Acceptable
Adequate wiring, well insulated, grounded, protected from damage		
Assured grounding program followed		
Ground fault circuit interrupters used		
Terminal boxes equipped with required covers		

5. LADDERS

Item	Acceptable	Not Acceptable
Ladders inspected and in good condition		
Ladders properly secured to prevent slipping, sliding, or falling		
Metal ladders not used around electrical hazards		
Ladder safety feet in use		

6. SCAFFOLDING

Item	Acceptable	Not Acceptable
Erection properly supervised		
All structural members meet safety factors		
All connections secure		
Scaffold tied into the structure when required		
Working areas free of grease		
Workers protected from falling objects		

7. BARRICADES

Item	Acceptable	Not Acceptable
Floor and wall openings planked over or barricaded		
Roadways or walkway hazards effectively barricaded		
Barricades illuminated or reflective at night		

8. HANDLING AND STORAGE OF MATERIALS

Item	Acceptable	Not Acceptable
Materials properly stored or stacked		
Passageways clear		
Materials protected against weather conditions		
Dust protection observed		
Traffic controlled in the storage area		

9. EXCAVATION AND SHORING

Item	Acceptable	Not Acceptable
Adjacent structures properly shored		
Excavation shored, shielded, or sloped as required		
Roads and sidewalks supported and protected		
Material stored away from excavations		
Excavation barricades and lighting adequate		
Equipment a safe distance from edge of excavation		
Ladders provided		

10. STEEL ERECTION

Item	Acceptable	Not Acceptable
Fall protection provided with safety nets, planked floors, or personnel restraint devices		
Hard hats worn as required		
Tools and materials secured from falling		
Fire hazards at rivet, forge, and welding operations eliminated		
Floor openings covered or barricaded		
Ladders, stairs, or other safe access provided		
Daily inspection of hoisting apparatus		
Employees prohibited from riding the ball		

11. LIFTING AND BACK SAFETY

Item	Acceptable	Not Acceptable
Team lifting used for heavy or awkward loads		
Mechanical lifting devices used when appropriate		
Work hardening program used for returning time-loss employees		

Chapter (7)

RISK MANAGEMENT PLAN

Chapter 7: RISK MANAGEMENT PLAN

7.1–RISK MANAGEMENT PLAN:

The construction industry will always take some risk on their projects. Therefore, it is not hyperbole to say that having a thorough risk management plan is mandatory for all construction operations.

Risk management in construction is a crucial iterative aspect of project planning and execution, aimed at identifying, assessing, and mitigating potential risks that could impact the successful completion of the construction project throughout its lifecycle.

7.2–Roles and responsibilities

This section outlines the roles and responsibilities which are assigned for

the management of risks in the Project.

Risk Management involves the above-mentioned participants to identify, evaluate and control risks. In addition to the Project Manager the participants are implicated as follows:

- Risk Coordinator: Brings support for risks identification and mitigation actions, performs analyses, reports and recommendations. The Risk Coordinator works within the QSE Department. His role is to organize the process and facilitate the circulation of information from the site to the Project Manager.

- Risk Owner: Is the person who has the authority, competence or experience to ensure a proper follow-up of the risks and the Action Plans associated. He must collaborate with the Risk Coordinator to identify, evaluate risks and propose appropriate risk mitigation actions assigned to a Responsible of Actions.

▪ Responsible of Action: Person or party responsible to implement actions defined to mitigate risk criticality.

▪ **Main Subcontractors/Suppliers and Partners:** Main Subcontractors/Suppliers and Partners participate in the Risk Management process, collaborating in risk analysis, implementing mitigation actions where they are responsible, and providing feedback on the effectiveness of mitigation actions to the Risk Owner.

▪ **Client:** The Client's contribution to the process is a factor of success for the Project. In agreement with the Client, this contribution shall be organized to benefit to the Project. Further communications could be considered (periodic risk meeting, announcement of new significant risks, interviews…) with the Client's approval.

7.3–Risk Management Plan Steps:

Risk management is a process of five steps that helps us to act in response to risks whenever they occur.

1. Identifying potential risk.
2. Analyzing, assessing, and prioritizing risks.
3. Develop risk response plan.
4. Monitor risk plan implementation and applying controls.
5. Performing risk audits and reviews.

Risk Identification:

It is a crucial step in the construction management process as it helps project teams proactively identify potential threats and opportunities that could impact the successful completion of a construction project. This Process includes:

▪ Checklist

▪ Brainstorming

▪ Interviewing & Questionnaires

▪ Historical information / records

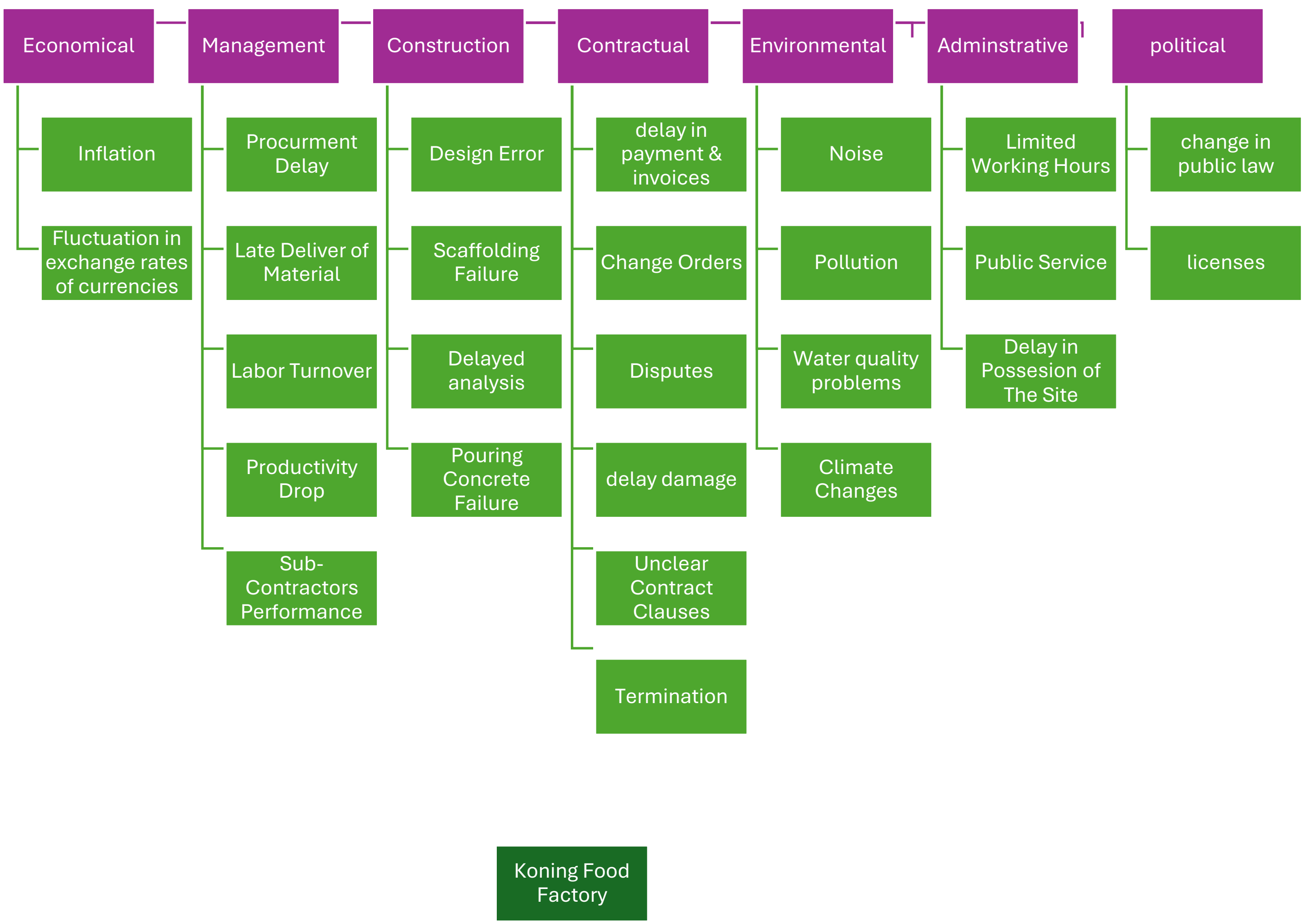
7.4–RISK MANAGEMENT PLAN:

1. Identifying potential risk.
2. Analyzing, assessing, and prioritizing risks.
3. Develop risk response plan.
4. Monitor risk plan implementation and applying controls.
5. Performing risk audits and reviews.

7.5Risk Types & Categories:

1) Economy.
2) Management.
3) Construction methods.
4) Contractual & Law.
5) Environment.
6) Administrative
7) Political

7.6–RBS


Economical
Inflation
Fluctuation in exchange rates of currencies
Management
Procurment Delay
Late Deliver of Material
Labor Turnover
Productivity Drop
Sub-Contractors Performance
Construction
Design Error
Scaffolding Failure
Delayed analysis
Pouring Concrete Failure
Contractual
delay in payment & invoices
Change Orders
Disputes
delay damage
Unclear Contract Clauses
Termination
Environmental
Noise
Pollution
Water quality problems
Climate Changes
Adminstrative
Limited Working Hours
Public Service
Delay in Possesion of The Site
political
change in public law
licenses
Koning Food Factory

RISK LIST

ECONOMICAL	Inflation	The rate of increase in prices over a given period of time	Threat
	Delay in Payment	Happens when a business pays its invoice later than the agreed date	Threat
	Delay Damage	If the Contractor fails to complete their Works within the Time for Completion	Threat
	Fluctuations in exchange rate	occur when foreign currencies undergo changes in value	Threat
Management	Sub-Contractor Performance	a process that involves overseeing the lifecycle of one or more subcontracts for an employer	Threat
	Design Error	can adversely influence project performance and can contribute to failures, accidents, and loss of life	Threat
	Scaffolding Failure	Failure to properly anchor scaffolding can result in swaying or toppling	Threat
	Delayed analysis	the dates and durations of selected activities shown on the as-planned schedule with the actual dates and durations on an as-built schedule	Threat

	Pouring Concrete Failure	using too much water while mixing the concrete, not allowing it to cure properly, or failing to install reinforcements correctly	Threat
Construction **Contractual & Law**	Change in Public Law	means any amendment, modification, superseding act, deletion, addition or change in or to Applicable Law	Threat
Construction	Change Orders	a written amendment to an existing contract after the effective date that alters the work, the contract sum, or the contract time	Oppourtunity-threat
	Disputes	Is a disagreement between parties over the terms or performance of a legally binding contract	Threat
	License	Is a legal agreement between two parties	Threat
	Unclear Contract Clause	Unclear parties may cause disagree on their interpretation, necessitating court intervention.	Threat
Contractual & Law	Termination	The natural end of a relationship between the parties	Threat

Environmental Administrative	Noise	Can affect on workers at project	Threat
	Pollution	is defined as activity that generates pollutants	Threat
	Water Quality Problems	Can affect on workers at project	Threat
	Climate	Can affect on workers at project	Threat
	Limited Working Hours	any of the hours a day during work is done, usually between 9 a.m. and 5 p. m	Threat
Environmental	Public Services		Threat
	Delay in Possession of The Site		Threat

7.7–Risks Analyzing & Assessment

Risk Qualitative assessment:

Risk qualitative assessment is a critical process in construction project management aimed at identifying and evaluating potential risks that could impact the project's objectives. One widely used method for this assessment is the Probability-Impact Matrix.

Probability-Impact Matrix:

The Probability-Impact Matrix is a tool that helps project managers prioritize risks based on their likelihood of occurrence (probability) and the severity of their consequences (impact). This matrix provides a visual representation that aids in understanding which risks require immediate attention and which can be monitored or accepted.

		Severity				
Probability		1	2	3	4	5
	1	1	2	3	4	5
	2	2	4	6	8	10
	3	3	6	9	12	15
	4	4	8	12	16	20
	5	5	10	15	20	25

No	1	2	3	4	5
Description	Very Low	Low	Moderate	High	Very High

Low	1	2	3	4		
Moderate	5	6	7	8	9	10
High	15	16	20	25		

No	Category	Risk Name	Probability (%)	Trigger	Impact	Severity	Probability Scale (1-5)	Criticality Score	Assessment
1	Economical/Financial	Local & Global Inflation	85	Due to Egypt's economic instability, there is a risk that inflation might happen	It will affect the schedule and the cost significantly	4	5	20	High
2	Economical/Financial	Delay damages	50	The contractor delays in Delivering the project. It's a Widespread risk.	Penalties must be applied.	2	3	6	Moderate
3	Economical/Financial	Delay in Payments & invoices	30	Delays in completing work items	That would affect cost and delay TOC for	3	2	6	Moderate
4	Economical/Financial	Fluctuation in exchange rates of currencies	70	Excessive changes undergo in currencies changes & values.	Will affect the cost.	4	4	16	High
5	Economical/Financial	Effective Procurement plan with supplieds and vendors	40	Effective procurement plan can preserve cost and avoid extravagance	Affect the Cost	2	3	6	Moderate
6	Economical/Financial	Construction Cost Overrun	60	Poor Planning and needs for workcrashing	Affect the Cost, Time, and Quality	3	4	12	Moderate
7	Economical/Financial	Taxs Changes	5	Taxs Might Change from government	Affect the Cost & Prices of materials might increase	4	1	4	Low
8	Management	Poor Planning	30	Some Planners do not have adequate experience and skills.	Delay in time and different final cost.	4	2	8	Moderate
9	Management	inaccurate cost and budget Estimation	70	Cost Estimators need to have many years of experince & to be daily updated with market prices	Affect Cost	4	4	16	High
10	Management	Late Deliver of Material	50	Due to the location of the project, the material will deliver late.	Delay in time; therefore, liquidated damage for contractor.	3	3	9	Moderate
11	Management	Procurement Delay	50	The imported Materials might arrive late.	Delay in schedule	3	3	9	Moderate
12	Management	Productivity Drop	80	Human factor and lack of supervision and foremen.	May affect the schedule and the cost negatively	3	5	15	High
13	Management	Unclear communication	30	Communication system needs to be clearly defined & updates-delivery system	Affect Time & Quality	2	2	4	Low
14	Management	Labor Turnover	60	Some labors work in different projects in parallel	Delay in schedule	2	4	8	Moderate
15	Management	Sub-Contractors unsatisfying Performance	70	They don't give a rise to obtain good quality.	Affect Quality & Cost.	3	4	12	Moderate
16	Management	inaccurate documentation system	50	Frequent changes in project documents and poor communication among stakeholders	Non-Conformance Report (NCR), and Affect Time, Potential rework, ultimately affecting project efficiency and budget.	3	3	9	Moderate
17	Management	High Wastage and consumption of materials	50	insufficient training of workers on efficient material usage	increased project costs, delays in project completion due to material shortages	2	3	6	Moderate
18	Management	Poor Vendor Selection	10	Inadequate vendor assessment processes & lack of clear selection criteria	substandard quality of goods or services	3	1	3	Low
19	Management	Loss or damage to goods in transit	20	improper handling procedures	delays in project timelines, additional costs for replacing damaged goods	4	2	8	Moderate
20	Management	Reactivity Of Materials	10	Improper storage conditions	Safety hazards for workers, equipment damage, environmental contamination. This all will impact Cost & Timeline	2	1	2	Low
21	Construction	Design Errors	60	Some Designs have not been thoroughly reviewed	Affect schedule	4	4	16	High
22	Construction	Collapse of Sheet Piles	20	Misalignment	Delay in time	2	2	4	Low
23	Construction	Crane Collapse	0.2	Poor maintenance practices, and Poor labor skills	Might cause crises, and cause losses in lives, cost, and time.	5	1	5	Moderate
24	Construction	Scaffolding Failure	5	Negligent manufacturing, unsafe scaffold design, improper secure, support, stabilize, or fasten scaffolds.	Might cause crises, and cause losses in lives, cost, and time.	5	1	5	Moderate
25	Construction	Pouring Concrete Failure	40	Inadequate compaction or Improper placement techniques.	Affect the schedule and delay it, might cost too	4	3	12	Moderate
26	Construction	Delayed Tests	60	Contractors Slacking.	Additional cost if remedies needed	3	4	12	Moderate
27	Contractual & law-related	Change Orders	40	Variations take place in most of construction projects.	Affect in time.	3	3	9	Moderate
28	Contractual & law-related	Disputes	25	Usually, many conflicts happen between employer and contractors.	Affects both time & cost.	3	2	6	Moderate
29	Contractual & law-related	Lack of qualified experienced subcontractors in local market.	40	High demand & limited availability of skilled labor	Affect Cost, Time, and Quality	3	3	9	Moderate
30	Contractual & law-related	Licenses	20	Regulatory Affairs might refuse to give licenses.	Delay in time.	3	2	6	Moderate
31	Contractual & law-related	Delay in Payments & invoices	30	Delays in completing work items	That would affect cost and delay TOC for the project.	3	2	6	Moderate
32	Contractual & law-related	Unclear Contract Clauses	10	Many previous disputes came from this risk.	Effect on time and cost	5	1	5	Moderate
33	Environmental	Climate Changes	30	Unforeseen risks from weather fluctuations.	Delay in time and decreases productivity.	4	2	8	Moderate
34	Environmental	Water quality problems	10	The location is still uncongested.	Affects cost	2	1	2	Low
35	Environmental	Pollution	30	Labors mostly leave working area messy.	Might cause fines& will have effects on environment	2	2	4	Low
36	Environmental	Environmental Impact	30	Noise	Effect on Environment and some stakeholders.	1	2	2	Low

7.8–Risk Quantitative Analysis

Risk Description:

Inflation, whether at the local or global level, poses a significant risk to construction engineering projects. Local inflation refers to the increase in prices of materials and services, while global inflation encompasses broader economic trends impacting worldwide markets.

Local inflation can directly impact construction projects by driving up the costs of materials and equipment within the project's region. This increase in costs can lead to budget overruns, delays, and potentially even the abandonment of projects if stakeholders cannot absorb the additional expenses.

Quantitative Risk Analysis

1- Risk: Steel Structure Price Inflation to be 100,000 instead of 75,000

Probability: 10%

Impact: 369ton*(90000-75000) =5,535,000

Contingency= Probability*Impact = 553,000

2-Risk: Cement increase from 3000/ton to 4000 EGP/ton

Probability: **60%**

Impact: 3051.5*0.3*(4000-3000) = **915,450**

Contingency= Probability*Impact = **549,270**

3-Risk: Steel Rft Price Inflation 38000 to 41000 EGP/ton

Probability: 15%

Impact: 248*(42000-38000) =**992,000**

Contingency= Probability*Impact = **148,800**

4-Risk: Delay Damage (contract)

Probability: **5%**

Impact: 10% of contract= **30,000,000**

Contingency= Probability*Impact = **1,500,00**

Total Contingency=**2,751,570**

Percentage of Contingency= Total Contingency/Total Direct Cost=**1.02%**

7.9–Quantitative Risk Analysis chart

Risk	Type	Probability	Impact	Contingency
Steel Structure Price Inflation to be 90,000 instead of 75,000	Threat	10%	5,535,000	553,500
Cement increase from 3000/ton to 4000 EGP/ton	Threat	60%	915,450	549,270
Steel Rft Price Inflation 38000 to 41000 EGP/ton	Threat	15%	992,000	148,800
Delay Damage (contract)	Threat	5%	30,000,000	1,500,000
			Total Contingency	**2,751,570**
			Total Direct + Indirect Cost	**1.02%**

7.10–Cost Estimate and Cash Flow

Direct Cost			225,546,020
Indirect		15%	33,831,903
Overheads		5%	11,277,301
Direct + Indirect =			270,655,224
Contingency		1.02%	2,751,570
After Adding Contingency			273,406,794
Adding Profit		5%	13,670,340
VAT		5%	13,670,340
Price			300,000,000

Chapter (8)

Project Quality Plan

Chapter 8:Project Quality Plan

8.1– Introduction:

The purpose of this document is to create a quality management plan that describes the standards, roles, responsibilities, methodologies, tools, and activities for quality management of a **Watch mall project**.

Definitions:

Quality

Quality can be defined as conformance to requirements and fitness for use. It means the project must produce what it said it would produce and what it produces must satisfy real needs. For the Project Manager, quality means satisfying the client , respecting methods, policies andstandards.

Quality Management Plan (QMP)

Documents the process for ensuring quality measure are implemented on a project by defining quality methodology, standards, criteria, activities, expectations, tools and resources, reporting and corrective actions. The QMP serves as the foundation for quality management on any project and addresses Quality Planning (QP), Quality Assurance (QA), Quality Control (QC), and Quality Improvement (QI).

Quality Planning (QP)

It is the foundation of our quality management system, encompassing the development of strategies and methodologies to meet customer expectations. This is the phase the QMP is developed.

Quality Assurance (QA)

It is a monitoring approach that evaluates various aspects of an acquisition project or service to determine if the production process meets the minimum quality standards.

Quality Control (QC)

It is a crucial component of our quality management system, focusing on the identification and correction of defects in products or processes.

Quality Improvement (QI)

It is an ongoing effort to enhance processes, products, or services based on feedback, data analysis, and innovation.

Project Deliverables & Project Processes

The key project deliverables and processes are subject to quality review.

Deliverable Quality Standards

The quality standards are the "measures" used to determine a successful outcome for a deliverable. These standards may vary depending on the type of information technology project.

Customer Satisfaction

The customer satisfaction criteria describe when each deliverable is complete and acceptable as defined by the customer. Deliverables are evaluated against these criteria.

Quality Control Activities

The quality control activities monitor and verify that the project deliverables meet defined quality standards.

Process Quality Standards

The quality standards are the "measures" used to determine if project work processes are being followed.

Stakeholder Expectations

Stakeholder expectations describe when a project process is effective as defined by the project stakeholders. An example is the review and approval of all high-impact changes to the project.

Quality Assurance Activities

The quality assurance activities that monitor and verify that the processes used to manage and create the deliverables are followed and are effective.

Quality Improvement

Ensure that quality is constantly improving.

Roles and Responsibilities

Ensure everyone understands and knows their role in the quality management process.

8.2–Process Quality Standards

Process quality standards are the benchmarks used to determine whether project work processes are being followed accurately and effectively.

- Stakeholder Expectations: These define when a project process is considered effective, as determined by key stakeholders. For example, the formal review and approval of all major project changes.
- Quality Assurance Activities: These include monitoring and verifying that all procedures used to manage and produce project deliverables are properly followed and meet required standards.
- Quality Improvement: Continuous improvement is essential to enhance quality over time.
- Roles and Responsibilities: It is critical that all team members clearly understand their roles within the quality management process.

8.3–Quality Objectives

The project quality objectives are as follows:

- Defects: Maintain a defect rate below 10% of total products.
- Performance: Increase equipment performance
  to a minimum of 8 hours of operation per day.
- Efficiency: Achieve 85% improvement in operational efficiency.
- Safety: Ensure zero workplace safety incidents and zero product recalls.
- Delivery: Reach at least 80% on-time delivery rate.
- Customer Satisfaction: Maintain a 95% customer satisfaction rate.

8.4– Roles and Responsibilities

Project Director

Reports to: Managing Partner

Role Overview:

The Project Director is responsible for managing and overseeing the full execution of the project, ensuring alignment with the conditions of the contract and the interests of all stakeholders.

Key Responsibilities:

- Overall leadership and responsibility for project execution.
- Develop and manage the project budget, controlling expenditures to achieve planned profit margins.
- Supervise daily operations of the project.
- Initiate project planning and monitor progress against set targets.
- Define the construction methodology in coordination with the team.
- Manage value engineering, subcontractor selection, and material sourcing.
- Coordinate between project teams, suppliers, and subcontractors.
- Ensure safety through the implementation of a tailored safety plan.
- Guarantee compliance with specifications and contractual requirements.
- Monitor expenses and project budget adherence.
- Obtain approvals for variations and agree on valuations with consultants.
- Track progress to ensure timely completion; notify the client of any delays and submit extension of time claims as needed.
- Handle cash flow by submitting payment applications and collections.
- Conduct regular meetings with clients, representatives, and subcontractors to address execution issues and project scope.
- Review and enforce the Project Quality Plan.

Project Manager

Reports to: Project Director

Role Overview:

The Project Manager ensures a safe, efficient, and timely delivery of the project in accordance with cost, quality, and client expectations.

Key Responsibilities:

- Provide a safe environment for all personnel on-site.
- Own and manage the project schedule.
- Offer technical guidance and resolve critical site challenges.
- Optimize resource utilization including labor, materials, and equipment.
- Lead, motivate, and assess all supervised staff.
- Maintain strong relationships with client representatives.
- Direct all on-site operations and ensure smooth coordination between departments.
- Drive productivity and control costs.
- Ensure quality standards through implementation of QA/QC procedures.
- Monitor and improve progress, productivity, and commercial outcomes.
- Work closely with planning teams to develop accurate work schedules.
- Deploy staff efficiently and manage achievement of milestones and deadlines.
- Support career development of subordinates and monitor their performance.
- Supervise Construction Managers and report on-site issues,

  especially those related to quality.

QA/QC Officer

Reports to: Project Manager

Role Overview:

The QA/QC Officer oversees all quality assurance and control activities, ensuring adherence to the project's quality system and standards.

Key Responsibilities:

- Develop and implement the Project Quality Plan.
- Participate in supplier and subcontractor assessments.
- Coordinate with the client's quality representatives.
- Analyze data trends and share insights with management.
- Assist in preparing method statements, especially with the Safety Manager.
- Verify that all inspection and test plans are approved and work is proceeding accordingly.
- Prepare and maintain an audit schedule.
- Conduct internal and subcontractor audits.
- Monitor and resolve non-conformances.
- Contribute to regular reviews of the quality management system.
- Supervise field tests as per specifications.
- Ensure accurate and up-to-date quality records.
- Verify that all laborers are trained, qualified, and safety-aware.

Technical Manager

Reports to: Project Manager

Role Overview:

Acts as the link between the client, construction teams, and any external consultants or specialist contractors involved in the design and detailing work.

Key Responsibilities:

- Challenge designs to reduce waste, maximize value, and minimize risk.
- Implement and control processes for managing design documentation across all project stages.
- Ensure timely and accurate progress reporting on all design activities.
- Review design documents for buildability, safety, maintainability, and technical adequacy.
- Manage the production and issuance of technical drawings and design information.
- Conduct technical reviews of contract documents and identify incomplete design data.
- Collaborate with clients and internal teams to explore value engineering opportunities.
- Define roles and responsibilities of all design stakeholders.
- Support procurement by defining scope and reviewing deliverables from design teams.
- Ensure all issued design documents comply with contract and statutory requirements.
- Secure necessary approvals and permits from relevant authorities.
- Identify quality and tolerance issues during installation and report to the Construction Managers.

Construction Manager

Reports to: Project Manager

Role Overview:

Responsible for coordinating all on-site activities in line with budget, safety, and quality requirements.

Key Responsibilities:

- Follow and enforce the company's safety policies and procedures.
- Coordinate with the Project Manager to ensure effective labor and equipment availability.
- Implement and follow the Project Quality Plan and all relevant method statements.
- Ensure quality control measures are in place and reviewed as needed.
- Monitor site layout and setting out to ensure proper documentation and accuracy before construction.
- Ensure that construction complies with project drawings and specifications.
- Notify the client's representative in advance of inspections and ensure their participation.
- Report all extra work, day works, and delays, and reach agreements with the client's representative.
- Attend subcontractor meetings and manage daily coordination.
- Maintain a detailed site diary and weekly measurement and material reports.
- Produce as-built programs at the completion of each stage.
- Raise requisitions and prepare purchase orders as needed.
- Supervise temporary works and ensure their compliance during execution.
- Submit completed quality records to the document controller for approval.
- Carry out other duties assigned by the Project Manager.

Safety Officer

Reports to: Project Director

Role Overview:

Provides support and expert advice to ensure that all employees fulfill their health and safety obligations in compliance with project standards and safety regulations.

Key Responsibilities:

- Manage, direct, and coordinate the implementation of environmental, health, and safety programs.
- Supervise Safety Advisors/Coordinators to ensure adequate safety coverage and resources.
- Conduct timely investigations of all incidents, identifying root causes and preventive actions.
- Develop and maintain compliance programs and pollution prevention plans.
- Support senior managers in implementing corporate environmental, health, and safety strategies.
- Analyze work environments and recommend control measures to eliminate risks and prevent injuries or illness.

8.5– Quality Assurance (QA)

Quality Assurance (QA) is a comprehensive set of proactive procedures and plans aimed at ensuring that the end product meets all functional requirements, complies with relevant standards, and adheres to the project's contract documents. QA focuses on the quality of processes rather than the final product itself, making it a preventative measure initiated before work begins.

Key Elements of QA:

- Definition: QA ensures the final product satisfies both the owner and the end user by adhering to approved procedures and fulfilling functional requirements.
- Proactive Approach: QA begins before construction starts, aiming to prevent problems through structured planning.
- Process Focus: Emphasis is placed on using approved processes and predefined work packages.
- Inspection: Qualified inspectors assess materials, equipment, and workmanship for compliance.
- Contract Compliance: Contractors remain responsible for ensuring that all materials conform to contract specifications.
- Rejection and Retesting: Any material that fails inspection must be replaced and retested at the contractor's cost.

8.6–QA Inspections and Procedures

A. Excavation for Foundations and Structures

1. Excavation Planning

Schedule Development: Establish a clear excavation schedule to avoid damaging adjacent structures.

- Survey Accuracy: Use certified survey instruments for accurate measurement.
- Water Table Consideration: Consider the groundwater level's effect on excavation and surrounding foundations, particularly for basement structures.

2. Inspection During Excavation

- Dimension and Stability Checks: Ensure excavation matches design dimensions and the soil is stable.
- Soil Compaction: Confirm compaction at the base of the excavation.
- Buried Materials: Remove any debris, rocks, or organic matter.
- Shoring Inspection: Evaluate the need for shoring to meet safety requirements.

B. Replacement and Compaction

1. Backfill Schedule Development

- Plan a backfill sequence that avoids damaging adjacent structures.

2. Excavation Clearance

- Remove all debris or obstructions before backfilling.

3. Backfill Inspection

- Ensure activities comply with project drawings and specifications.

4. Compaction Inspection

- Verify that compaction methods and procedures meet design requirements.

5. Adjacent Foundations

- Use appropriate compaction techniques near existing structures.

6. Material Suitability

- Check and document the suitability of backfill material using soil analysis and compaction test results.

C.Concrete Materials Approval

1. Sampling and Testing

- Contractors must send samples of aggregates, sand, cement, water, and rebar for testing.
- Source certificates must be included.

2. Mill Certificate Verification

- Ensure steel and cement mill certificates meet project acceptance criteria.

3. Trial Mix

- Perform a trial mix to verify concrete meets design specifications.

4. Engineer Approval

- Supervisor engineer must approve all material samples after compliance is confirmed.

D. Pre-Concrete Placement Inspections

1. Soil Compaction

- Verify results against project specifications.

2. Subsurface Treatment (Blinding Layer)

- Ensure proper thickness and surface condition of blinding.

3. Formwork Inspection

- Coordination: Confirm alignment with control points.
- Elevation/Grade: Check accuracy.
- Orientation: Verify vertical/horizontal alignment.
- Reinforcement: Check ribs, ties, spacers, and supports.

4. Form Joints and Surfaces

- Crack and Hole Prevention: Prevent grout leaks.
- Cleanliness: Remove debris.
- Coating: Ensure form oil application is as required.

5. Additional Items

- Confirm placement of chamfer strips, construction joints, keyways, water stops, and check workmanship quality.

E. Post-Concrete Placement Inspections

1. Protection and Curing

- Protect concrete from extreme weather using approved methods.

2. Support Systems

- Do not remove supports until the concrete reaches required strength.

3. Formwork Removal

- Ensure timing aligns with design and test data.

4. Finishing Quality

- Check for honeycombs; apply protective finishes as necessary.

5. Cube Test Documentation

- Maintain comprehensive records of cube strength test results.

6. Grouting

- If specified, ensure proper grouting according to manufacturer instructions.

7. Load Application

- Prevent loading until concrete reaches specified strength.

F. Dewatering Procedures

1. Standard Compliance

- All dewatering must meet relevant standards.

2. Water Disposal

- Contractor is responsible for preventing water damage or hazards on-site.

3. Groundwater Management

- Maintain groundwater at least 0.5 m below excavation depth.
- Obtain engineer approval before ending dewatering.

4. Temporary Drainage

- Install drainage systems for surface and groundwater with prior approval.

5. Diversion Systems

- Divert rainwater outside excavation zones.
- Trenches must not be used as drainage channels.

6. Pumping Method

- Avoid bottom-pumping methods. Use gravity drains or sump pumps if ponding occurs.

8.7–Quality Control Procedures

Quality Control (QC) focuses on monitoring, measuring, and verifying that the materials and construction processes comply with contract specifications and approved designs. Unlike QA, QC is a reactive process initiated after work begins, mainly handled by the contractor under supervision.

Key QC Activities:

- **Review of Components:**
  - The QC team examines materials, dimensions, and procedures to confirm alignment with design requirements.
- **Testing:**
  - Various quality tests are performed throughout the construction phase to verify compliance with standards (e.g., slump tests, cube tests, rebar inspection).
- **Documentation:**
  - Any defects or deviations are recorded in daily reports for transparency and traceability.
- **Corrective Action:**
  - If deficiencies are found, the QC team recommends appropriate corrective measures to resolve issues and restore compliance.

1-Scope of Records

The following documents are generally included in the project quality records:

- Test Certificates
- Survey Data and Reports
- Licenses and Permits
- Design Checks and Calculations
- Inspection & Test Check Sheets
- Non-Conformance Reports (NCRs)
- Audit and Surveillance Reports
- Calibration Certificates
- Punch Lists
- Concrete Pour Records
- Request for Inspection (RFI)
- Field Change Requests (FCRs)
- Design Change Requests (DCRs)
- Material Receiving Reports (MRRs)
- Final Inspection Certificates (as required)
- As-Built Drawings
- Operation and Maintenance Manuals (O&M)

Inspection and Test Plan (ITP)

Abbreviations Used:

- QCIR – Quality Control Inspection Report
- RFI – Request for Inspection
- MIR – Material Inspection Request
- MRR – Material Receiving Report
- DWG – Drawing

Sample ITP Overview

Section	Inspection Process	Responsible Party	Frequency	Acceptance Criteria	Reference Code/Standard
Excavation	Approval of Method Statement	Consultant	N/A	N/A	Civil Drawings
	Final Formation Level Inspection	Consultant, Contractor	At every level change	Reaching Foundation Level	Civil Drawings
	Material Approval	QC Engineer	On material change	As per Specification Requirements	Technical Specs, Civil, DWG
	Surface Preparation	Consultant	N/A	Compliance with Project Specs	Technical Specs, Civil, DWG
	Release for Blinding Concrete	MEP Consultant, Contractor	N/A	MEP Embedded Items Must Be Installed	Technical Specs

Work Item	Inspection Process	Test/Check	Responsibility	Frequency	Acceptance Criteria	Tolerance	Reference
Blinding	Applied Over Blinding	N/A	N/A	N/A	N/A	N/A	N/A
Backfilling	Sand Cone Test	Sand Cone Test	Contractor	Every Layer	N/A	N/A	Tech. Spec.
Material Receiving & Storage	Material Receiving	MIR	QC Engineer	Each Delivery	N/A	N/A	Tech. Spec. & Material Tech. Data
Method Statement Approval	Approval for Materials	N/A	QC Engineer	N/A	Compliance with project specs/code	N/A	Tech. Spec. & Material Tech. Data
Waterproofing	Final Inspection + Leak Test	Leak Test	Contractor	Each Isolation Test	Cleanliness ensured, all dirt removed	N/A	Civil Drawing

Material Approval (Blocks)	Material Receiving	MIR	QC Engineer	Every Delivery	Avg. Net-area compressive strength ≥ 42.2 kg/cm²	N/A	Tech. Spec. & Civil DWG
Layout Checking	Layout Verification	N/A	Consultant	Every Floor	Compliance with project specs/code	±5 cm	Tech. Spec. & Civil DWG
Reinforcement/Anchor/Ties Installation	Installation Inspection	MIR	Contractor, Consultant	Each Installation	N/A	N/A	Tech. Spec. & Civil DWG
Block Works – Pre-Wetting & Placing	Start of Block Laying	N/A	Contractor	Start of Each Wall	Compliance with specs; Verticality ≤ 1 mm per 1m	≤1 mm	Tech. Spec. & Civil DWG
Plastering – Block Prep	Plastering Preparation	N/A	N/A	N/A	Compliance with specs; Dimensiona	±5 mm	Tech. Spec. & Civil DWG

					l deviation ±5 mm		
Plastering – Mixing & Placing	Plaster Mixing & Application	N/A	N/A	N/A	Compliance with specs; Plaster deviation ≤1 mm per 1m height	≤1 mm	Tech. Spec. & Civil DWG
Plastering – Final Application	Mortar Finish	N/A	N/A	N/A	Compliance with specs; Plaster deviation ≤1 mm per 1m height	≤1 mm	Tech. Spec. & Civil DWG
Curing (Block Works)	Wall Curing	N/A	Contractor	Each Wall	Compliance with specs/code	N/A	Tech. Spec. & Civil DWG
General Backfilling	Method Statement Approval	DS	Consultant	N/A	Compaction test should exceed 95%	2–5%	Tech. Spec. & DWG

	Backfill Material Approval	MIR	Consultant	N/A	N/A	N/A	Tech. Spec.
	Testing Laboratory Submission	Sand Cone, PLT Test	Contractor, Consultant	N/A	Material matches Geotechnical Report	N/A	Tech. Spec.
	Surveying/Setting Out	Surveying IR	Consultant	N/A	Leveling per drawings	N/A	Construction DWG, Tech. Spec.
	Compaction in Layers	Sand Cone	Consultant	N/A	Each layer ≤ 25 cm	+2–3 cm	Tech. Spec. & DWG
	Submit Test Results	N/A	N/A	Within 24 hrs of test	Each layer ≤ 25 cm per code	+2–3 cm	Tech. Spec.

Activity	Inspection Process	Test / Check	Responsibility	Frequency	Acceptance Criteria	Tolerance	Reference
Wall Finishing	Material Approval	MIR	Contractor	Each Delivery	Compliance with project specs	N/A	Tech. Spec. & Material Tech. Data
	Pre-Inspection	Visual Test	Consultant	N/A	Visual Inspection	N/A	Tech. Specification
	Plastering	Visual Test	Consultant	Each Wall	Dimensional check, alignment, plumb	≤1 mm per 1 m height	Civil Drawing
	Final Inspection	Visual Test	Consultant	N/A	Surface finish, alignment, dimensional check	≤1 mm per 1 m height	Civil Drawing

Checklist 1: Pre-Concreting & Excavation

Item	Check	YES	NO	Comments
1	Slab thickness, dimensions, reinforcement, and concrete cover	[ ]	[ ]	
2	Beam thickness, dimensions, reinforcement, and concrete cover	[ ]	[ ]	
3	Ready-mix concrete details reviewed	[ ]	[ ]	
4	Excavation drawings vs design drawings reviewed	[ ]	[ ]	
5	Excavation depth reviewed	[ ]	[ ]	
6	Excavation method reviewed	[ ]	[ ]	
7	Side and slope stability reviewed	[ ]	[ ]	
8	Check for existence of underground water	[ ]	[ ]	

Checklist 2: Concreting Works

Item	Check	YES	NO	Comments
1	Slump test conducted as per specification	[ ]	[ ]	
2	Pouring sequence is accurate	[ ]	[ ]	
3	No cracks visible during/after curing	[ ]	[ ]	
4	Concrete finishing is proper and smooth	[ ]	[ ]	
5	Adequate curing applied	[ ]	[ ]	
6	Proper adjustment of joints	[ ]	[ ]	

Additional Checks (Reinforcement and Dimensions)

Item	Check	YES	NO	Comments
1	Mesh checked and installed properly	[ ]	[ ]	
2	Dimensions match shop drawings	[ ]	[ ]	
3	Reinforcement cleaned properly	[ ]	[ ]	
4	Accurate splice length provided	[ ]	[ ]	
5	Concrete cover is within tolerance	[ ]	[ ]	
6	Reinforcement dimensions verified	[ ]	[ ]	

8.8-The Organizational Breakdown Structure (OBS):

Is a hierarchical representation of an organization's structure, showing the relationships between different departments, teams, and individuals. It is a framework that outlines the organizational units, roles, and responsibilities, and how they fit into the overall organizational architecture.

Alternative 1: (Projectized Organization Structure)

Advantages of the Alternative 1:

• Direct guidance: The Projectized OBS system allows for direct guidance of all team members towards the project's goals and requirements due to the clear specialization and focus on the project.

• Quick decision-making and adaptation: This organizational system enables faster response to changes and updates in the project due to decisions being made in a flexible and direct manner.

• Improved communication: The system helps enhance communication among team members and clearly defines responsibilities, reducing opportunities for confusion and dispersion.

• Enhanced efficiency: With customization and focus on the project, the team can be more effective in achieving project goals faster and more efficiently.

• Flexibility: The Projectized OBS system allows for flexibility in team formation and resource allocation according to the project's needs, making it more adaptable to various challenges that may arise.

• Utilizing the Projectized OBS system will facilitate the effective management of the mall project and ensure the desired results are achieved with minimal issues and delays.

Alternative 2 (Strong Matrix Organization)

Roles & Responsibilities of key personnel: Project manager: He reports to the Operations Manager of GAMA and is responsible for the following:

• Project on time and within limited budget and in accordance with localization.

• Directing and managing the project at all stages of implementation.

• Planning to act as a common site milestone, project standards.

• Ensure the quality of materials and fixtures work is done in accordance with project standards.

• Receipt of all design, graphics, and engineering information.

• Reviewing the detailed programs for the implement tation of the project and its continuation with the implementation manager and planning engineer.

• Implementation of all elements of the project's quality management system.

• Ensure that qualified personnel required for the project are prepared in a timely manner as required.

• Ensure implementation of all Occupational Health, Safety and HSE activities associated with the project.

• Review the project's labor requirements.

• Ensure proper planning of materials to allow sufficient time for approval and circulation of orders.

• Attending meetings with clients, consultants, and sub-contractors.

• Issuing instructions to sub-contractors to inform them of the available fields of work and to review the progress of their work. Technical office manager: He reports to the Project Manager and is responsible for the following:

• Replaces the Project Manager in all his responsibilities in his absence.

• Ensure receipt of all drawings and documents from the consultant.

• Ensure that technical documents are properly prepared, reviewed, controlled, and KONING FOOD FACTORY submitted in accordance with project specific requirements.

• Ensure that the owner's requirements are fully and correctly understood and communicated effectively to the project team.

• Ensure the achievement of the technical objectives required by the client.

• Maintain detailed records of technical releases and modifications. • Organizing meetings with the owner/consultant team as necessary for the purpose of properly interpreting contractual technical requirements or modifications to these requirements.

• Ensure that the work program allows for the appropriate time to complete the design and finalize the credits and for the purpose of submitting the design modifications required by the project management and for the client to benefit from the most economical implementation methods and alternative suppliers.

• Coordinate all material documents, submitted graphics and dependent documents.

• Coordinating the preparation of As-Built drawings and operation and maintenance manuals.

• Claims for time and costs

• Reviewing and making all monthly extracts up to the final extract for subcontractors. Structural engineer’s design: plan and oversee the construction of new buildings and bridges, or alterations and extensions to existing properties or other structures. It can be very satisfying to have the chance to see something you've had a part in become a reality. Architecture Engineer: analyze building or system prototypes submitted by architects to increase efficiency, decrease costs, and enforce adherence of building codes and compliance issues. These engineers must also evaluate KONING FACTORY proposed electrical systems to ensure occupational safety and assess window costs. Professionals in this field typically work in an office setting reviewing blueprints and may travel to a construction site to inspect foundations, support systems and layouts. Construction Manager: He reports to the Project Manager and is responsible for the following:

• Adhere to GAMA policies, quality procedures, regulations, and project specifications.

• Ensure that the quality of materials and execution of works are in accordance with the acceptance criteria specified for the project.

• Ensure that works are carried out in accordance with the quality, health, safety, and environmental plans of the project.

• Issuing instructions to the site engineers to complete the work in accordance with the project schedule.

• Monitoring all subcontractors' work to ensure compliance with the quality of works in accordance with specifications and completion of works in accordance with the contracted schedule.

• Reviewing short-term planning and advising the project manager on any issues.

• Materials and equipment management.

• Monitoring and evaluation of information on production rates.

• Define scaffolding increases/deficiencies for all projects and purchase, lease and subsequent repurchase of scaffolds if required. • Allocation of labor to various projects, reallocation, and transfer to other projects in consultation with the concerned project managers and project coordinators.

• Monitor the productivity of workers at the various project sites and take remedial action (if required) in liaison with the Operations Manager and Project Manager to develop productivity.

KONING FOOD FACTORY PROJECT Site Engineer: He reports to the Construction manager and is responsible for the following:

• The site engineer supervises the activities of supervisors, supervisors and work team leaders and is responsible for each of the following:

• Ensure that all details of the drawings are conveyed to his subordinates in a proper manner and with the required details wherever they are required.

• Full supervision of the works to ensure the quality of the required works in accordance with the specifications.

• Preparing work methods reports.

• Prepares inspection requests and delivers them to the Quality Control Department.

• Full awareness and strict implementation in accordance with the ITP Project Inspection and Monitoring Plan.

• Full awareness of customer complaints (internal and external).

• Take appropriate actions as required for internal audit reports. Supervisors:

• Inspecting construction sites regularly to identify and eliminate potential safety hazards.

• Supervising and instructing the construction team as well as subcontractors.

• Educating site workers on construction safety regulations and accident protocol.

• Enforcing site safety rules to minimize work-related accidents and injuries.

• Handling site accidents in accordance with established accident protocol.

• Maintaining an accurate record of construction employee attendance.

• Evaluating the performance of construction employees and instituting disciplinary measures as needed.

• Analyzing blueprints to ensure that construction projects meet design, safety, and budget specifications. efficiency.

• Recommending changes to construction operations or procedures to increase KONING FOOD FACTORY PROJECT Chief Foreman:

• Plan, implement and manage construction tasks in accordance with priorities and goals.

• Produce employee and project schedules

• Manage and monitor members attendance and work

• Adhere to relevant safety regulations

• Manage and guide the use of machinery and equipment

• Monitor expenditures

• Keep budget in check

• Peacefully resolve any emerging problems and issues

• Allocate and delegate responsibilities

• Supervise, train, and give feedback to workers

• Ensure labor and other resources necessary

• Prepare and present progress Procurement officer:

• Requesting and reviewing supplier quotations from a commercial standpoint.

• Processing requisition data through ERP system.

• Periodic negotiation of material rates.

• Expediting and ensuring timely deliveries.

• Maintaining supplier relationships and master data.

• Spend analysis.

• Financial reporting.

• Liaising with project managers to set & maintain budgets.

• Applying and engaging in LEAN initiatives within the purchasing process where possible.

• Investigation and evaluation of new potential suppliers, recommending those most desirable to senior management.

• Negotiating with partners for the recovery of defect products during the warranty KONING FOOD FACTORY PROJECT period. QC & QA Manager: He reports to the Quality Manager at GAMA, in coordination with the Project Manager,

And is responsible for the following:

• Responsible for all project elements related to quality control and the overall implementation of the quality management system on site.

• Preparing project specific quality plan, quality control and inspection procedures, test plans, checklists, and quality control checklists.

• Control all on-site inspection activities, receiving (for standing works items), work-in progress, final inspection activities and off-site inspections.

• Ensure the preparation of documents necessary to receive the work that has been performed.

• Ensure preparation of inspection requests and maintenance of relevant records. Quality control Engineer: He reports to the Quality Control Manager and is responsible for the following:

• Perform all required inspections as stipulated in the ITP Project Plan daily.

• Ensure that the latest version of approved engineering documents is used and followed during construction.

• Reviewing IR requests submitted by the Implementation Department.

• Daily coordination with the consultant in receiving IR requests submitted.

• Ensure that all necessary re-testing is performed to meet specification requirements Quality assurance Engineer:

• the process or set of processes used to measure and assure the quality of a product.

Health, Safety and Environment Manager: He reports to the Health, Safety and Environment Manager at GAMA in coordination with the Project Manager and is responsible for the following: KONING FOOD FACTORY PROJECT.

• Implementation of safety programs and training for all safety personnel, project team and workers.

• Prevent accidents on site by following workers' attention and safety directives.

• Ensure the validity of fire extinguishers and fire extinguishing systems (if available).

• Ensure availability of PPE.

• Ensure availability of first aid kits.

• Recording any accident in the accident report form that explains the reasons and appropriate methods to prevent accidents. Planning Manager: Supervises requirements planning for department, division, project, or organization. Supervises other planning personnel, such as consultants and developers. Prepares budget and oversees expenditures. Sets goals, policies, and procedures for project.

Cost Control Engineer: Responsible to control and monitor project total expenditure including verifying and checking of invoices and claims from suppliers, vendors and subcontractors to ensure that all project expenditures are captured and properly recorded.

Documentation Engineer: Documentation engineers use computer design software to produce specifications for the products that are being developed or to detail the process involved in performing specific tasks.

Documentation engineers may work in mechanical engineering, industrial engineering, or other engineering fields.

What-if Scenario Analysis

Chapter (9)

What if scenario

Chapter 9: What if scenario

9.1–Introduction

What-if Scenario is a brainstorming approach that uses wide questioning to problems or accidents that may happen & ensure that the appropriate solution will be implemented in case these scenarios happen. and thinking to overcome the problem and evaluate different scenarios to predict their effects both positive and negative on the project objectives which the unexpected situations does not only catch the project team off-guard, but it also affects the entire project processes. which always leads to the question "What if that happened?

9.2–Scenario 1: Advanced Payment to be 25% instead of 20%

As we've studied Overdraft Analysis earlier, it resulted that the contractor would take a loan from Egyptian banks and increase the project price to be 311 million instead of 300 million to cover his 7 month-66 million cash flow deficit.

In this Scenario, the contractor will convince the employer to increase the advanced payment to be 25% instead of 20%, it will result decrease of overdraft to be 6 months period with amount equals 57 million,

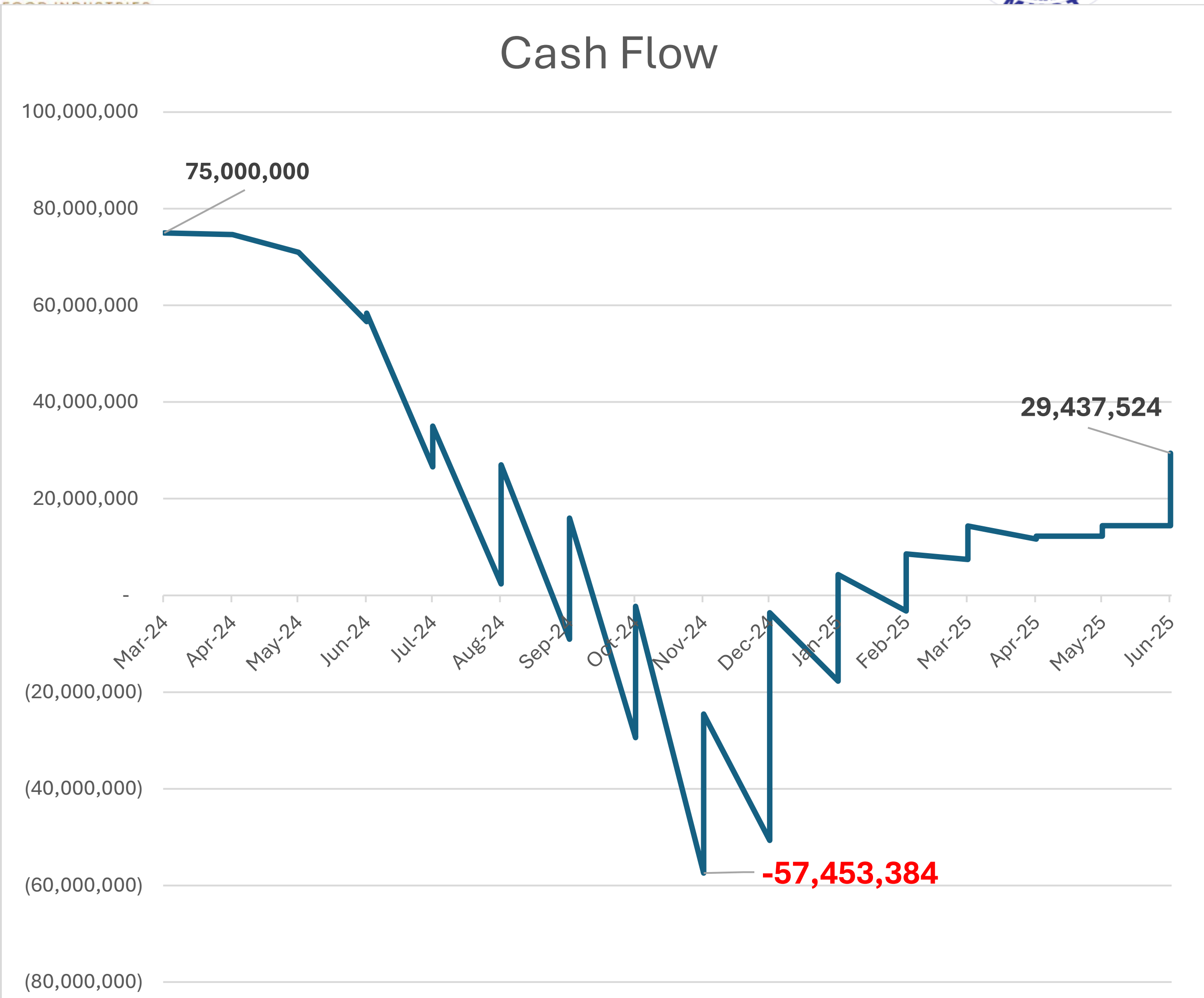
Then taking the new loan with duration 6 months of 7 months would result that project price will be **(308 million instead of 311 million 1% discount percent)**

Analysis: Cash In and Cash Flow with 25% advanced payment:

		Monthly Cash In	Cum Cash In
Mar-24	**Month 0**	**$75,000,000**	**$75,000,000**
Apr-24	**Month 1**	$0	$75,000,000
May-24	**Month 2**	$0	$75,000,000
Jun-24	**Month 3**	$1,708,147	$76,708,147
Jul-24	**Month 4**	$8,436,871	$85,145,018
Aug-24	**Month 5**	$24,638,853	$109,783,871
Sep-24	**Month 6**	$25,051,487	$134,835,358
Oct-24	**Month 7**	$27,133,330	$161,968,688
Nov-24	**Month 8**	$32,926,111	$194,894,799
Dec-24	**Month 9**	$47,091,966	$241,986,765
Jan-25	**Month 10**	$22,049,077	$264,035,842
Feb-25	**Month 11**	$11,819,997	$275,855,839
Mar-25	**Month 12**	$6,897,177	$282,753,017
Apr-25	**Month 13**	$641,327	$283,394,344
May-25	**Month 14**	$2,115,273	$285,509,617
Jun-25	**Month 15**	**$15,036,401**	**$300,546,018**

Total **$300,546,018**

	End of Month Balance	Balance after invoice
Mar-24	75,000,000	75,000,000
Apr-24	74,633,969	74,633,969
May-24	70,995,911	70,995,911
Jun-24	56,676,651	58,384,798
Jul-24	26,617,851	35,054,722
Aug-24	2,399,558	27,038,411
Sep-24	-9,088,609	15,962,878
Oct-24	-29,406,233	-2,272,903
Nov-24	**-57,453,384**	-24,527,273
Dec-24	-50,684,140	-3,592,174
Jan-25	-17,734,424	4,314,653
Feb-25	-3,212,607	8,607,391
Mar-25	7,466,982	14,364,159
Apr-25	11,644,522	12,285,849
May-25	12,285,849	14,401,122
Jun-25	14,401,122	29,437,524



Then Overdraft will be 57,453,384 EGP

The Bank Interset Charges 29% annual, then for 6 months will be 14.5% equals 8,330,740.61 EGP.

Then new contract price will be 308,330,741 EGP instead of 311,205,826

Then increasing advanced payment to be 25% would be a Win-Win Situation.

9.3–Scenario 2: Cement Price Inflation

In this scenario we will study the impact of cement price increase on contractor's cash out.

As per project time schedule we will need most of our ready mix concrete for foundations by 4th month of

project, while economic predictions say that cement price will increase by almost 45%

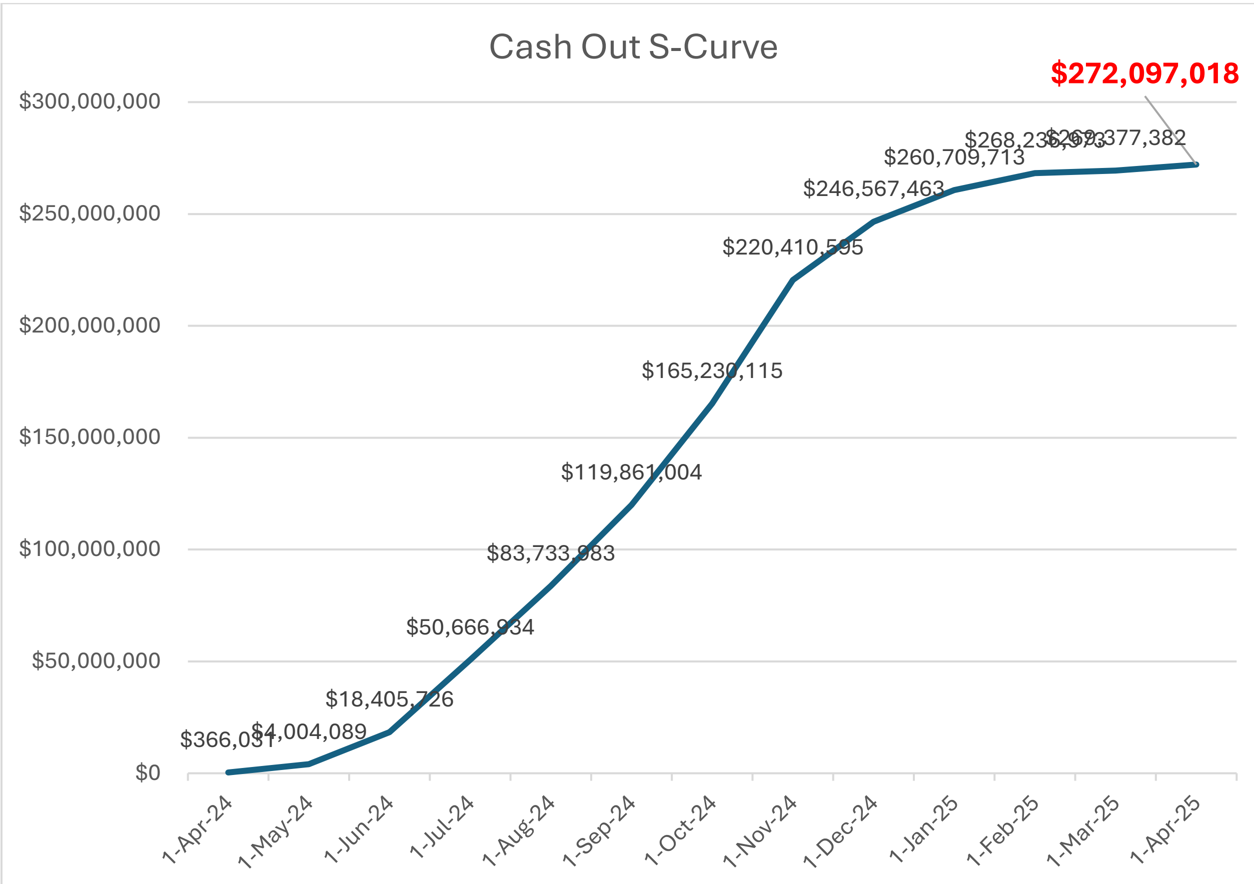
Scenario	Contract Price 4/2024	Predicted on 4th month 8/2024
Cement increase from 1950/ton to 2850 EGP/ton	1950 LE/ton	2850 LE/ton

We have 3051 m3 of concrete for foundations with average cement content of 300 kg/m3

Then, Our Concrete items will be over budget by 3051.5*0.3*(2850-1950) = 823,770 EGP

Then, our cash out will increase through the 4th till 5th month by this amount.

Spreadsheet Field	1-Apr-24	1-May-24	1-Jun-24	1-Jul-24	1-Aug-24
Monthly Direct Cost	$0	$1,830,157	$9,039,505	**$26,810,656**	**$27,252,764**
Cum Direct Cost	$0	$1,830,157	$10,869,663	$37,268,433	$64,109,313



As our contract is Lump Sump contract contractor shall not be compensated for this inflation.

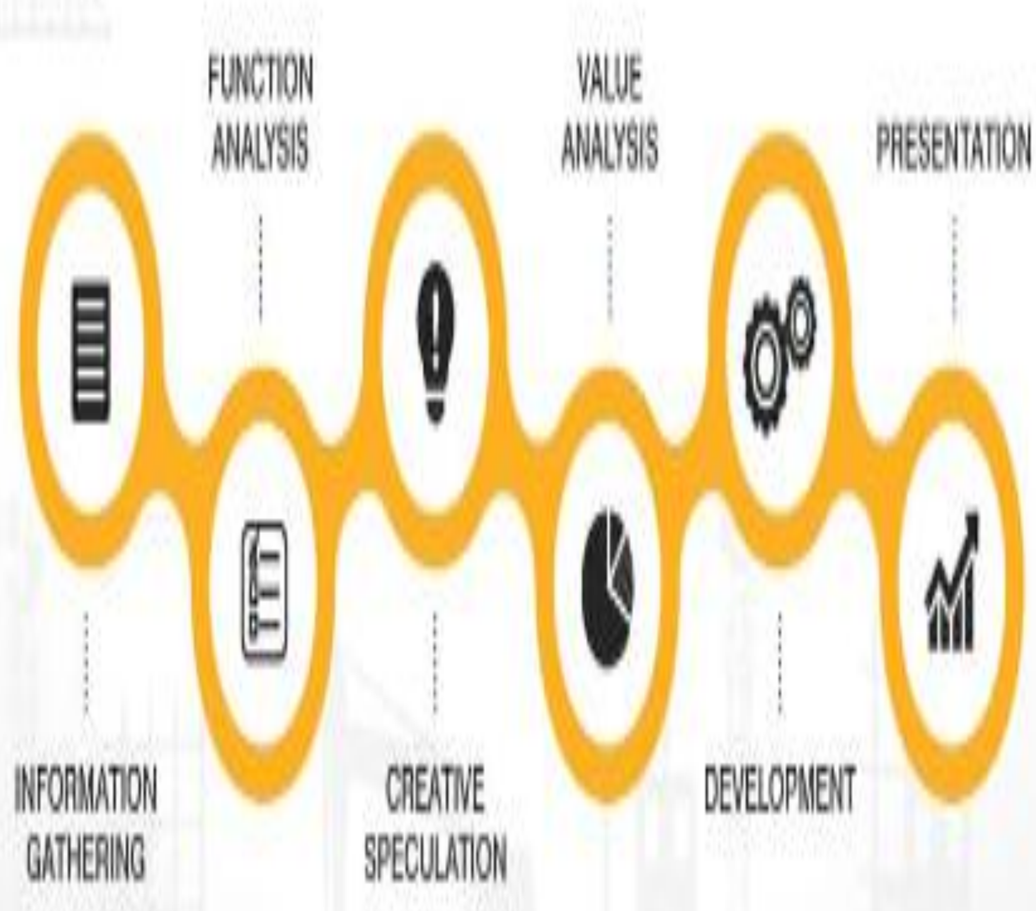
Action:

1- Contractor to buy all cement needed quantity by start of project.
OR

2- Contractor to convince the Employer to add Escalation Formula to contract for cement price to be compensated for this direct cost increase.

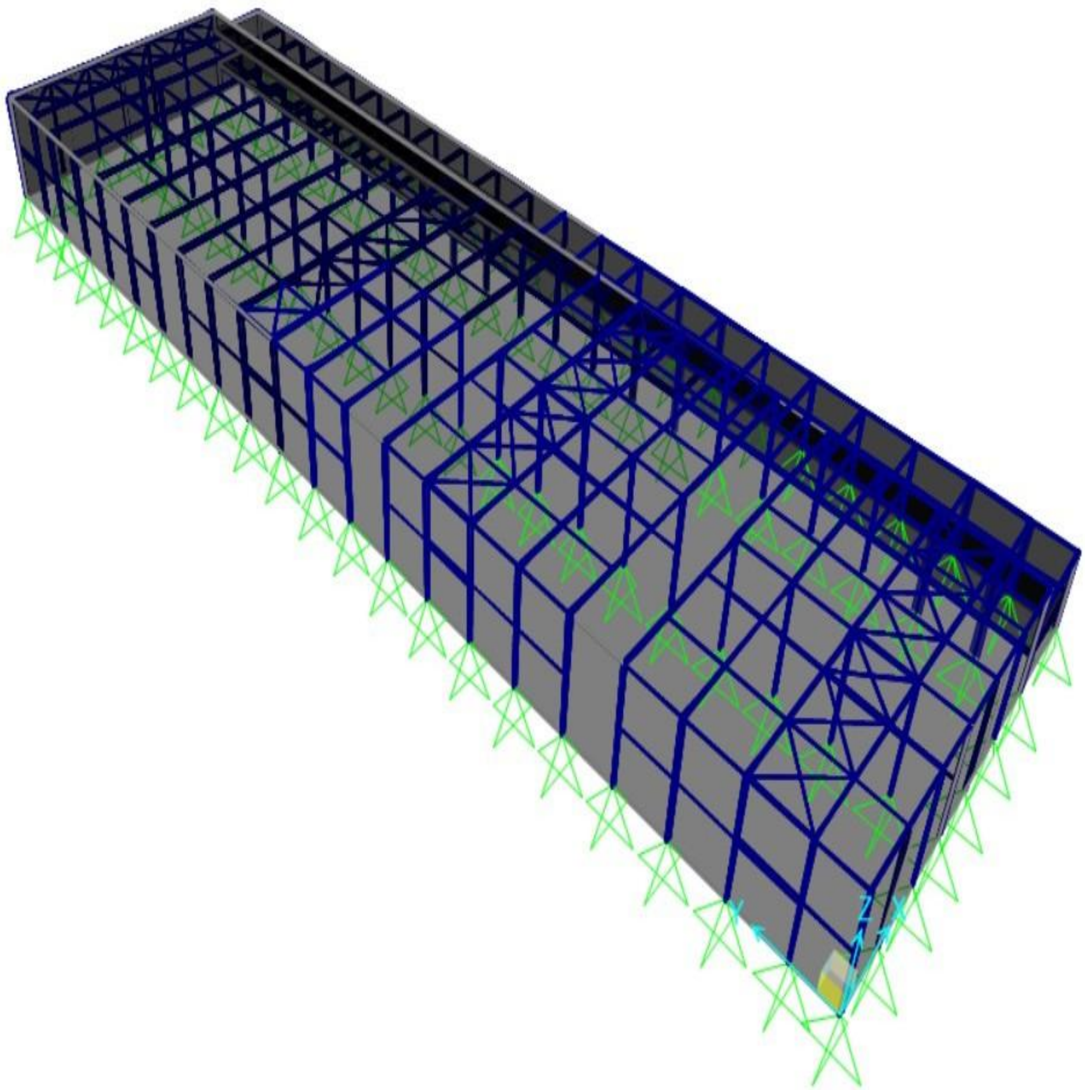
Chapter (10)

Value Engineering



Chapter 10 : Value Engineering

10.1–Steel Technical Report



10.2–Structural Technical Report

For Steel Structure wall

Issue/Revision	Issue-1	Revision-1	Revision-2
Remarks	-		
Date	JAN-2025		
Prepared by			
Checked by			

10.3-Design Criteria

Introduction

SAP Structure analysis will be used to check and design the steel sections and IDEA STAICA for connections design.

Cover

COVER SHEETING

Concrete

Grade of concrete= F'c =32 Mpa

Reinforcement steel= Fe 420 Mpa 2-

1- DESIGN CODES.

- ECP-203 = Wind Load calculations.
- ECP-ASD = Structural use of steelworks in building.
- Bs1881 = Structural use of concrete.

2-2- Materials

2-2-1 Steel Structure

- Steel grade = A992FY50
- Density = 7850kg/cum

2-2-2 Steel Plates

- Steel grade = ASTM A36
- Welding electrodes: E70XX

3.3 Design loads

3.3.1 Dead loads.

-Self weight of the structural steel members (calculated by SAP structural)

-Own weight of the FINISH FLOOR For MEZZANINE = 150 kg/m^2

-Own weight of the For MEZZANINE SLAB = 250 kg/m^2

-Own weight of the COVER For ROOF = 30 kg/m^2

3.3.2 LIVE loads.

-ROOF LIVE LOAD = 60 kg/m^2

-MEZZANINE ROOF LIVE LOAD = 100 kg/m^2

-MEZZANINE LIVE LOAD = 250 kg/m^2

3.3.2 Wind Load

Wind load is calculation is performed using ECP203

Wind Speed V = 33 m/s

Height above ground level = 11.5 m

Topography factor K = 1.15 Air

Density = 1.25 kg/m^3

Cs = 1

Ct = 1

-Velocity pressure $q_{z1} = 0.05 * 10^{-3} * \rho * (V)^2 * Cs * Ct$

$= 0.05 * 10^{-3} * 1.25 * (33)^2 * 1 * 1$

$= 0.068$ t/m^2

1-WL

P(wall1)= 0.068*1.15*0.8 = 0.063

P(wall2)= 0.068*1.15*-0.8 = -0.063

P(wall3)= 0.068*1.15*-0.8 = -0.063

P(wall4)= 0.068*1.15*-0.5 = -0.039

P(wall5)= 0.068*1.15*-0.7 = -0.055

P(wall6)= 0.068*1.15*-0.7 = -0.055

1-WR

P(wall1)= 0.068*1.15*-0.5 = -0.039

P(wall2)= 0.068*1.15*-0.8 = -0.063

P(wall3)= 0.068*1.15*-0.8 = -0.063

P(wall4)= 0.068*1.15*0.8 = 0.063

P(wall5)= 0.068*1.15*-0.7 = -0.055

P(wall6)= 0.068*1.15*-0.7 = -0.055

1-WF

P(wall1)= 0.068*1.15*-0.7 = -0.055

P(wall2)= 0.068*1.15*-0.8 = -0.063

P(wall3)= 0.068*1.15*-0.8 = -0.063

P(wall4)= 0.068*1.15*-0.7 = -0.055

P(wall5)= 0.068*1.15*0.8 = 0.063

P(wall6)= 0.068*1.15*-0.5 = -0.039

1-WB

P(wall1)= 0.068*1.15*-0.7 = -0.055

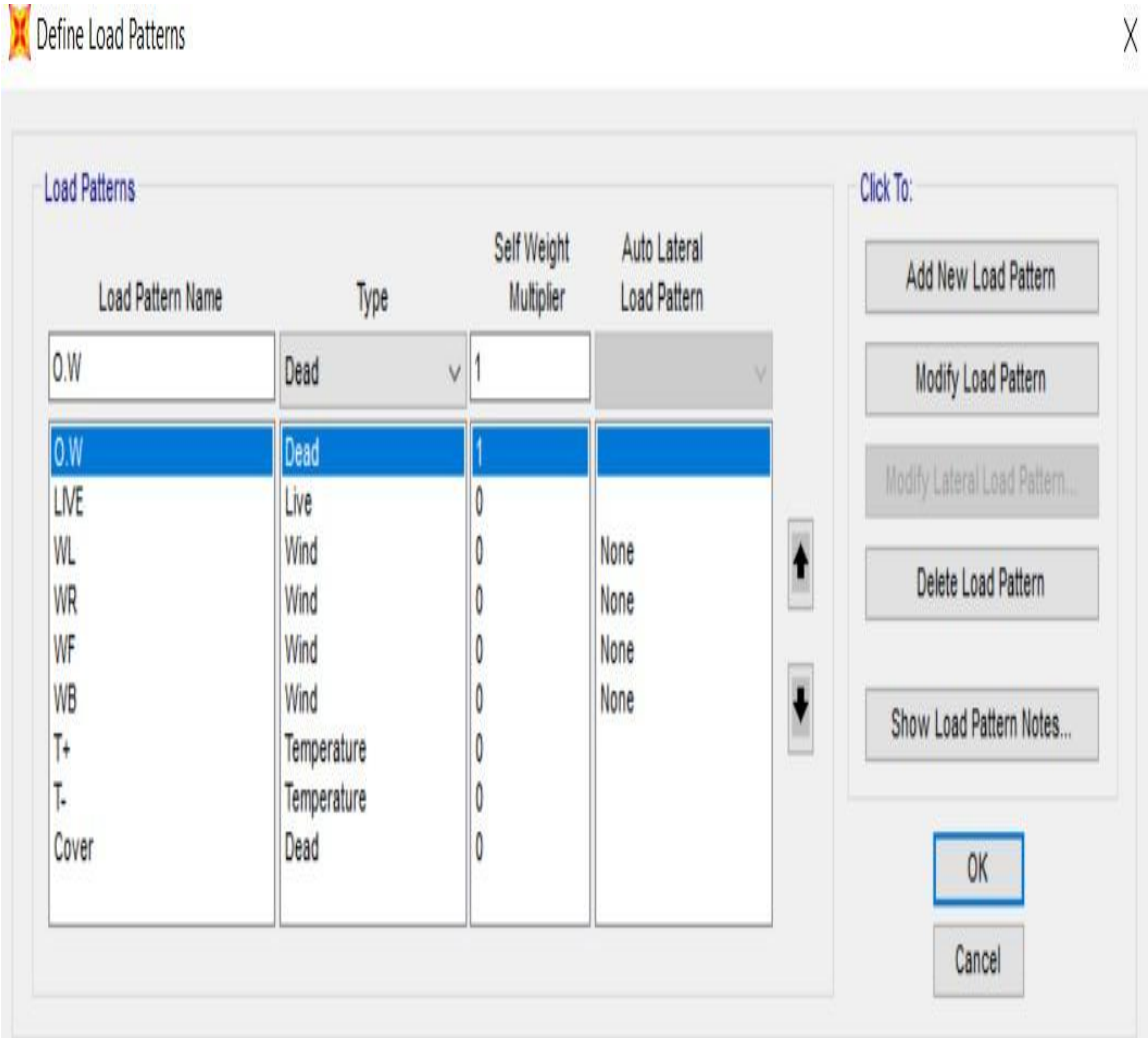
P(wall2)= 0.068*1.15*-0.8 = -0.063

P(wall3)= 0.068*1.15*-0.8 = -0.063

P(wall4)= 0.068*1.15*-0.7 = -0.055

P(wall5)= 0.068*1.15*-0.5 = -0.039

P(wall6)= 0.068*1.15*0.8 = 0.063



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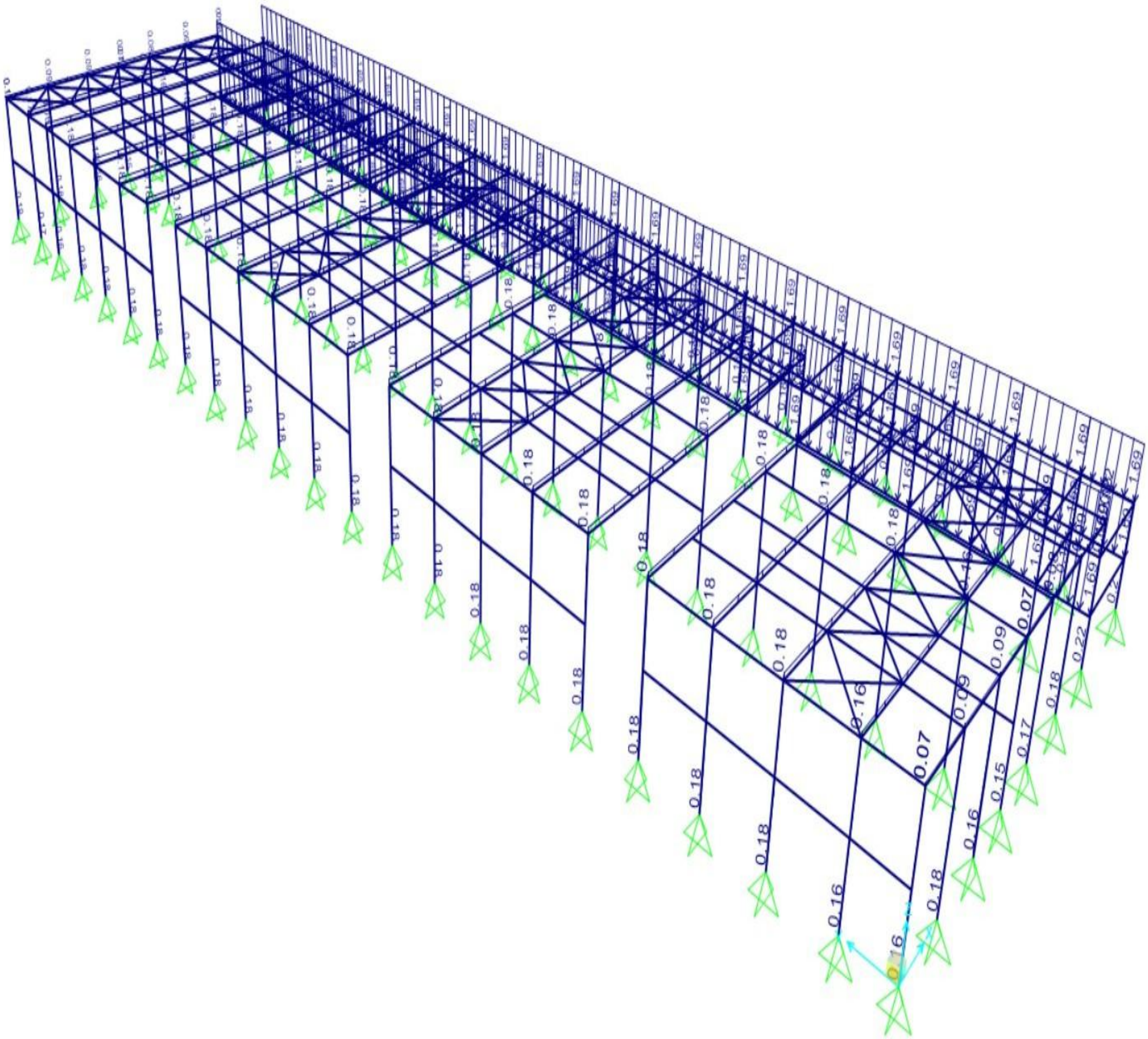
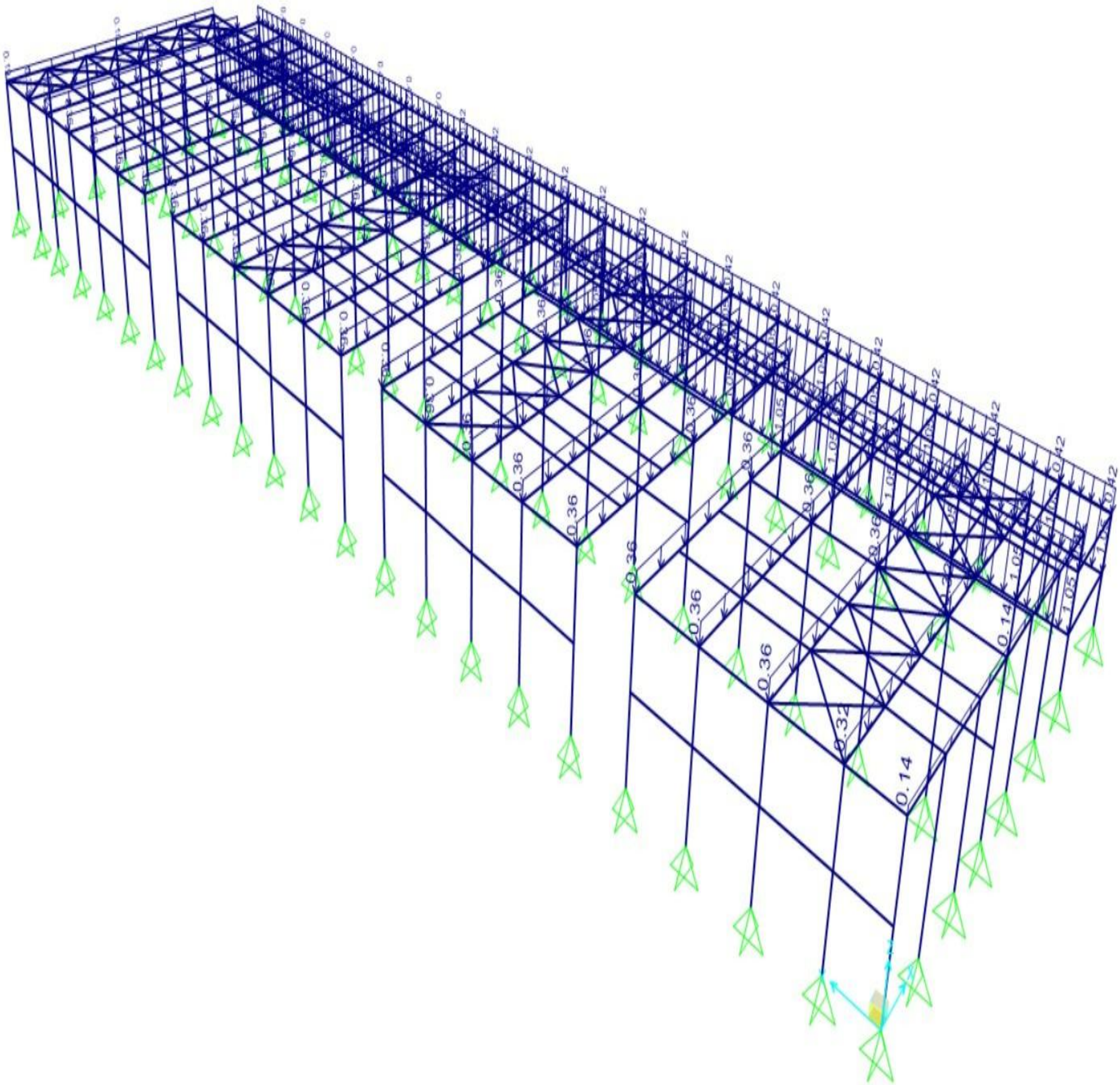
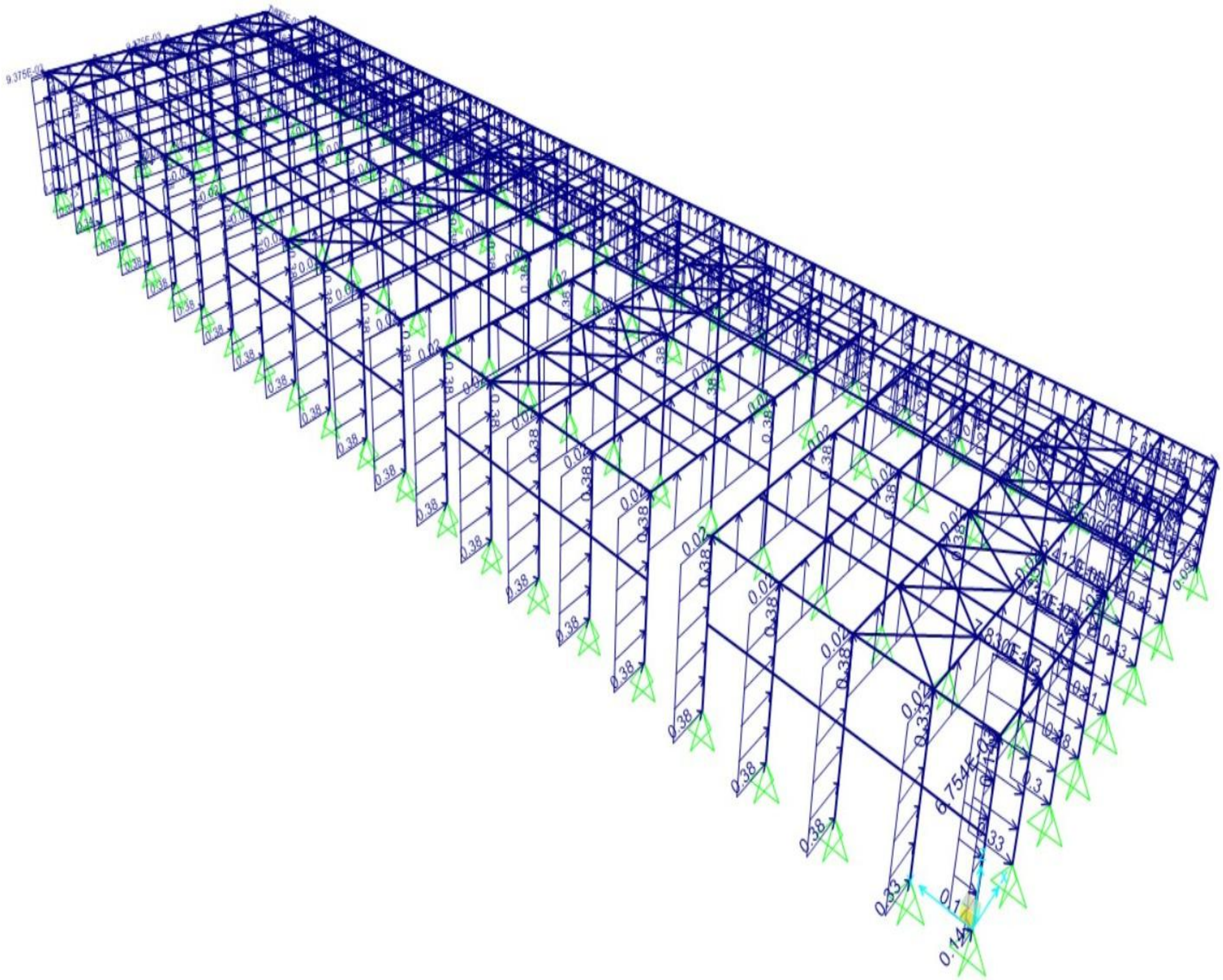


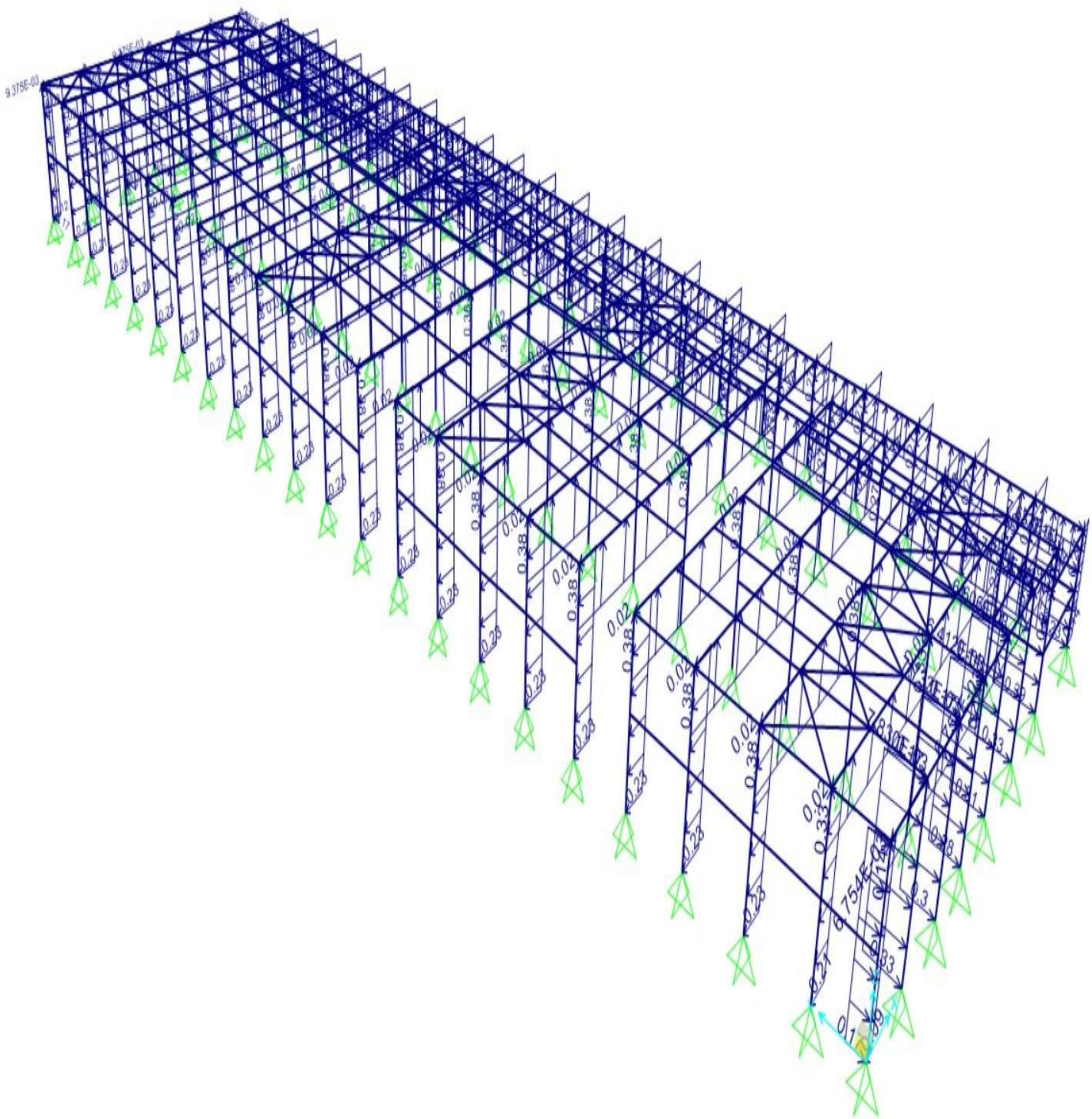
DEAD LOAD



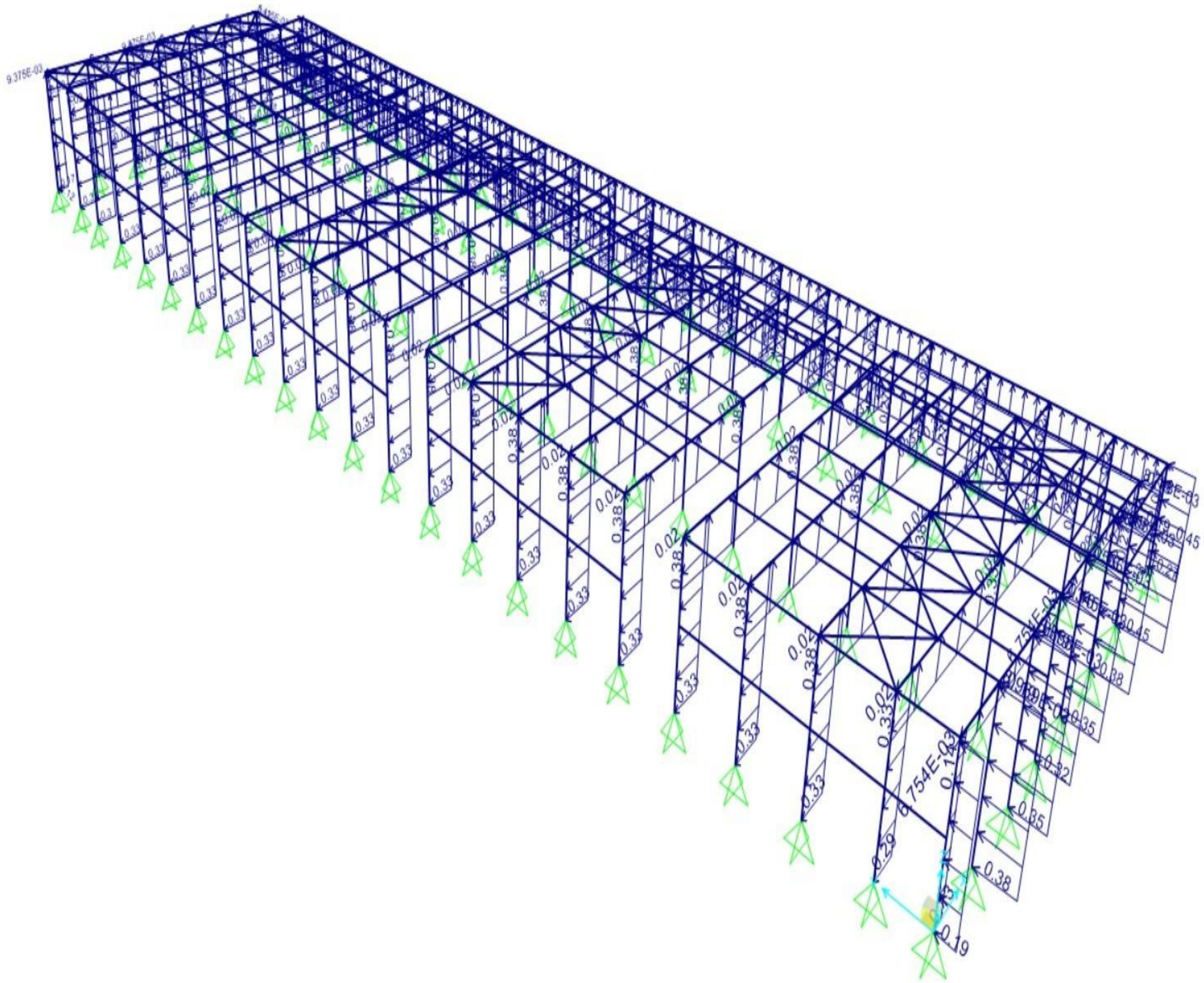
LIVE LOAD



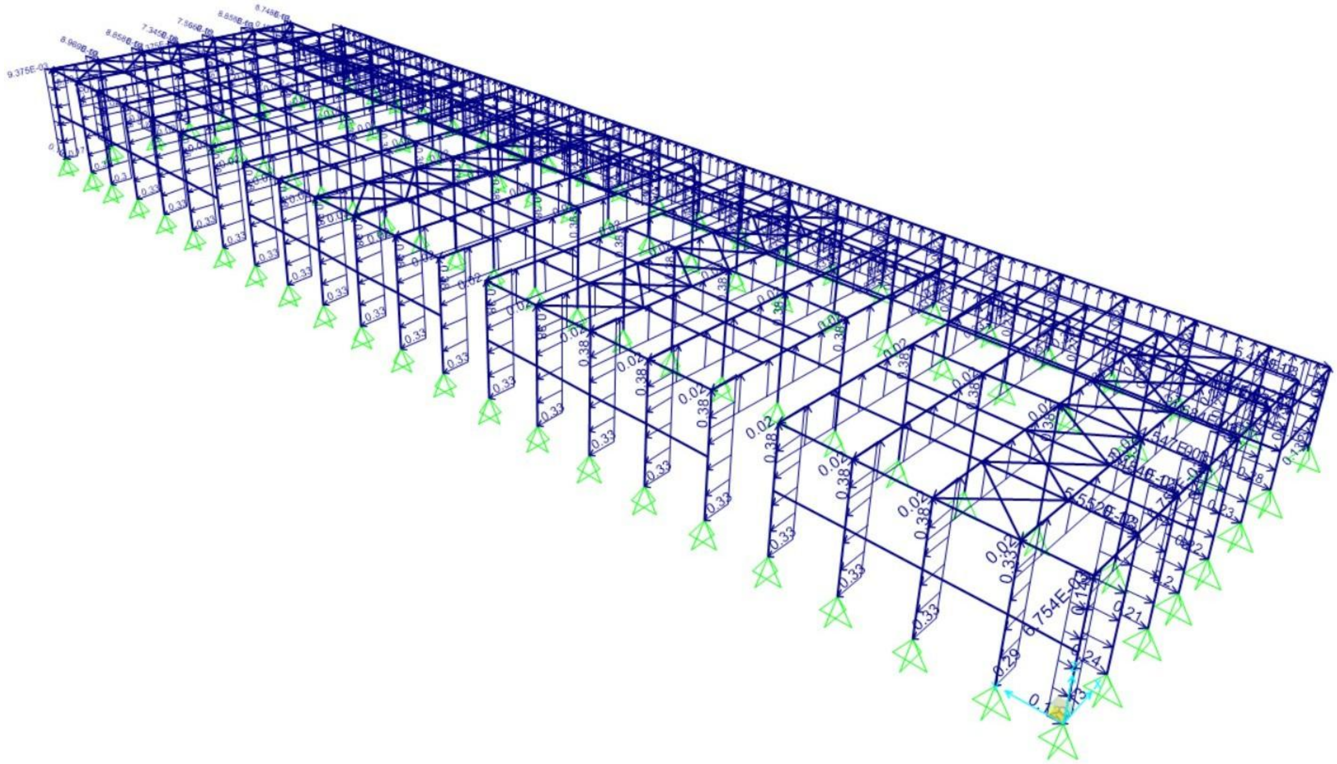
WIND LEFT



WIND RIGHT



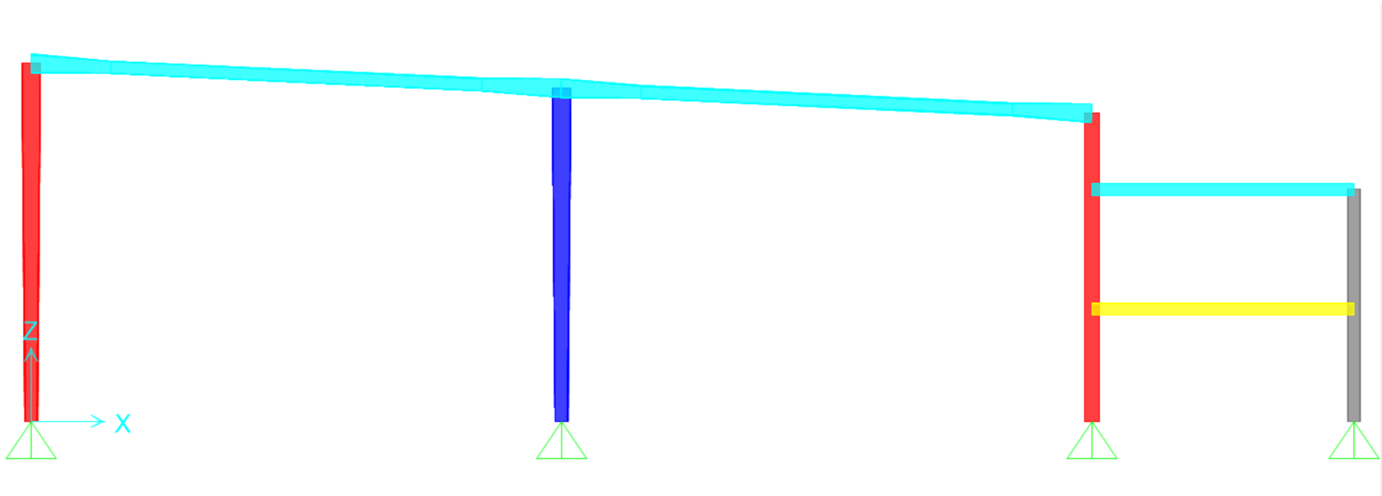
WIND FORWARD

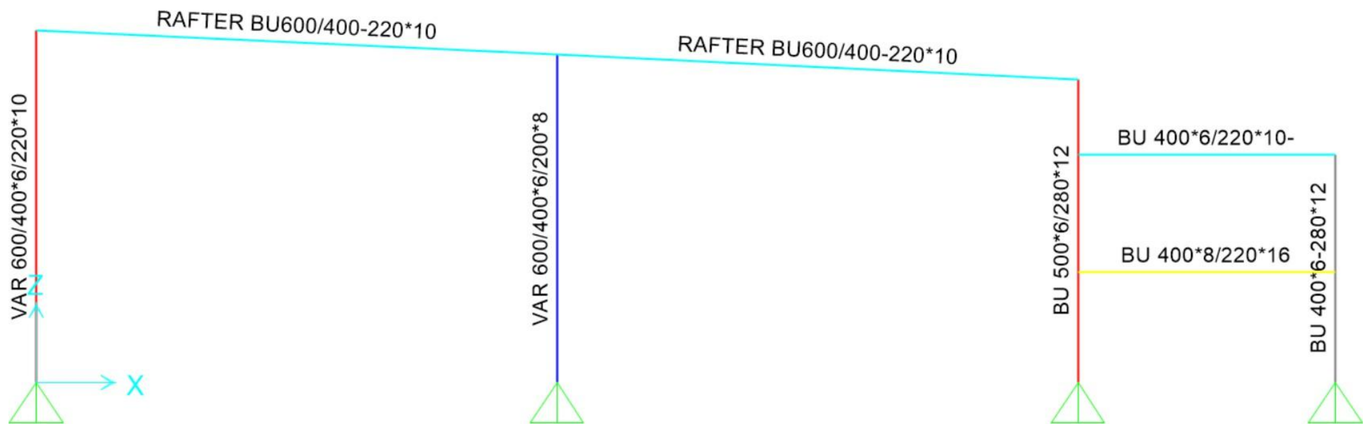


WIND BACKWARD

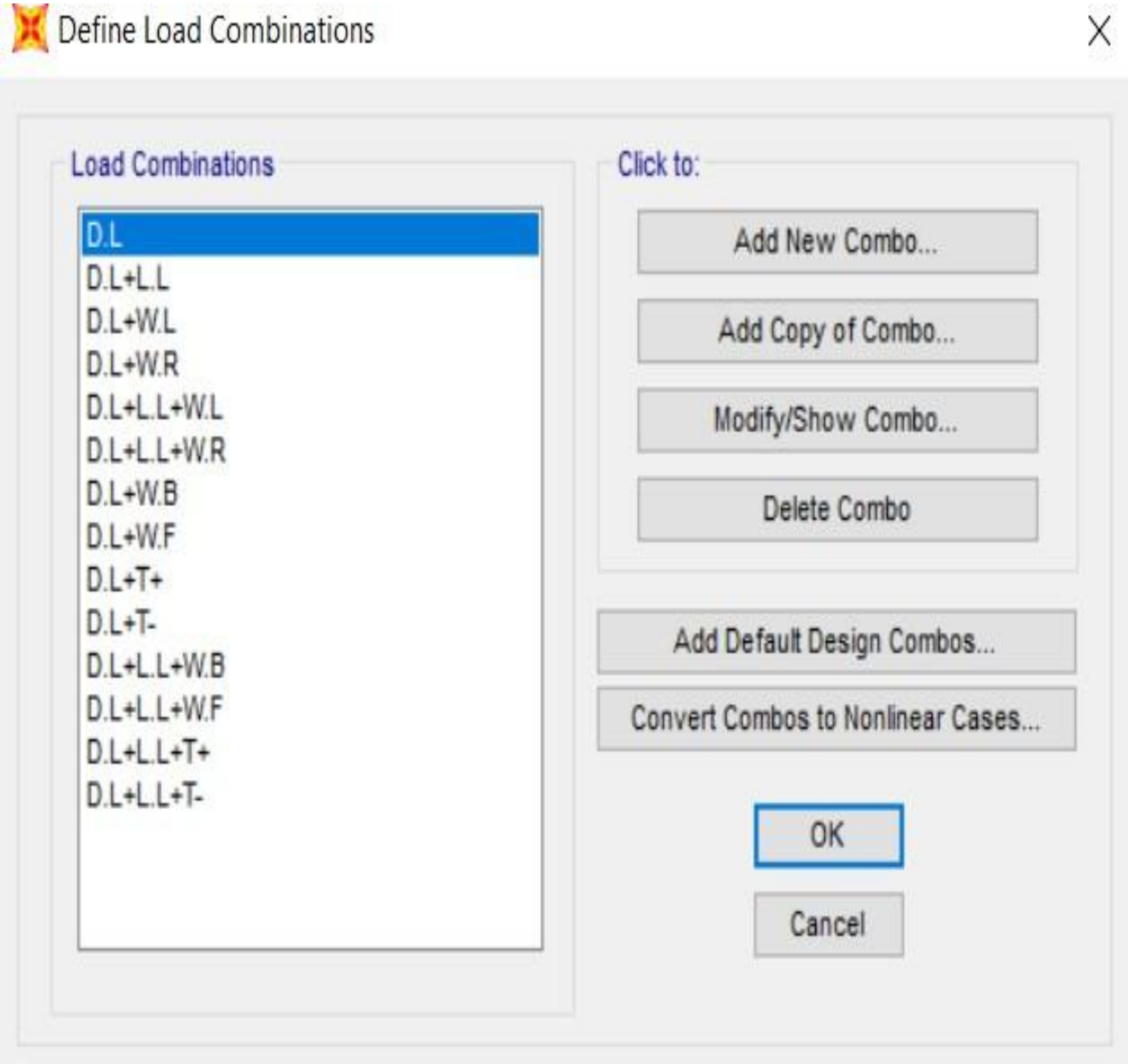
OPTION1 (HINGE SUPPORT)

Figure 2





SECTIONS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Load Combinations
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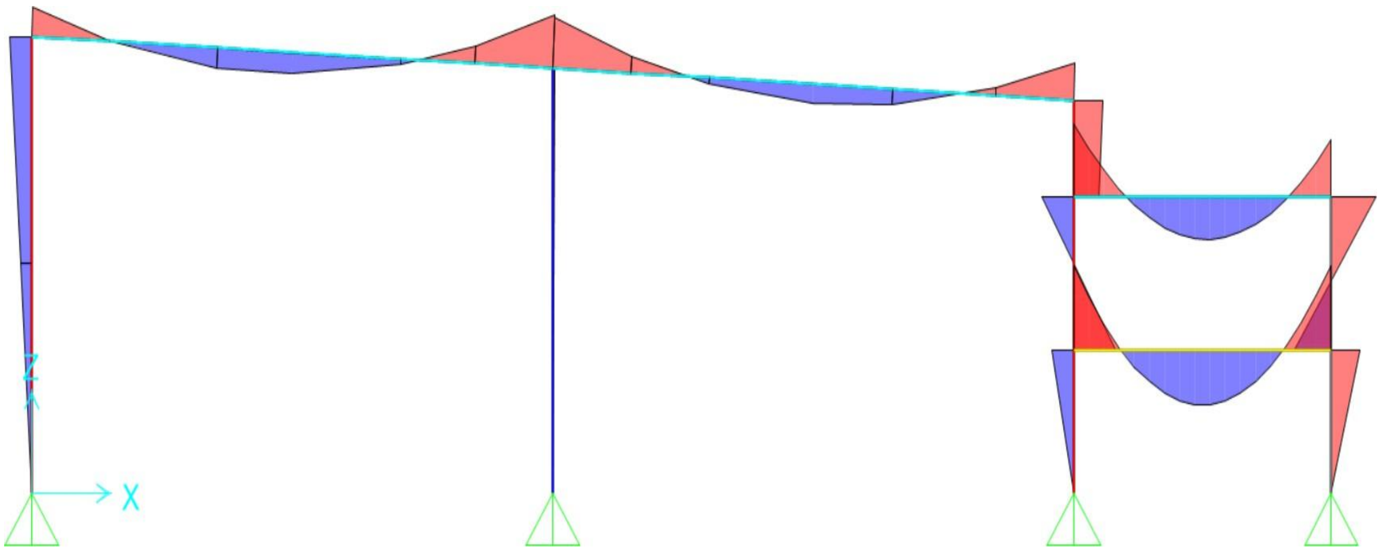
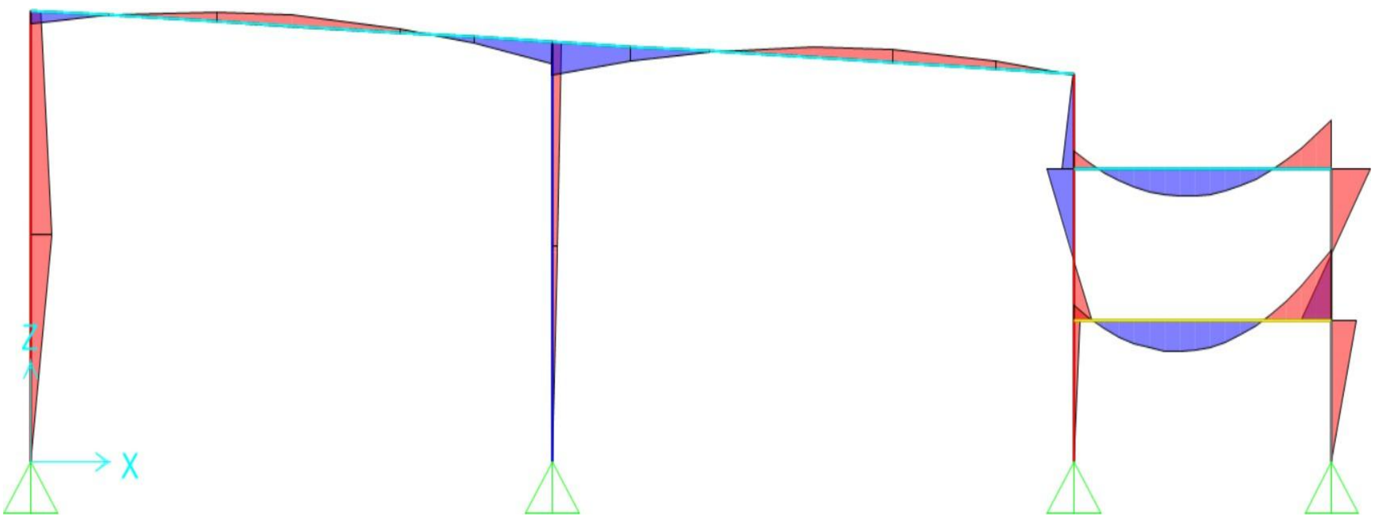
D.L+L.L
D.L+W.L
D.L+W.R
D.L+L.L+W.L
D.L+L.L+W.R
D.L+W.B
D.L+W.F
D.L+T+
D.L+T-
D.L+L.L+W.B
D.L+L.L+W.F
D.L+L.L+T+
D.L+L.L+T-
Click to:
Add New Combo...
Add Copy of Combo...
Modify/Show Combo...
Delete Combo
Add Default Design Combos...
Convert Combos to Nonlinear Cases...
OK
Cancel

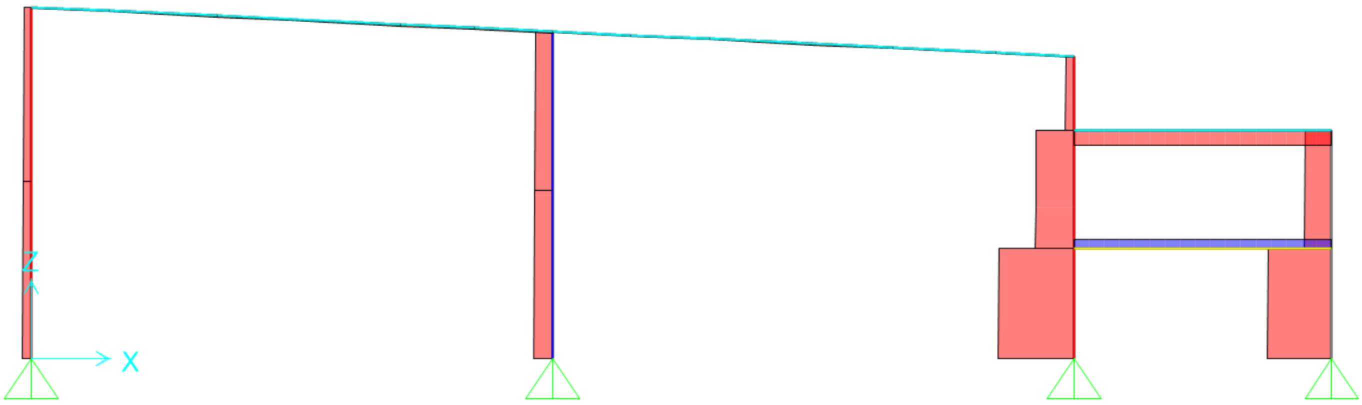
Figure 1



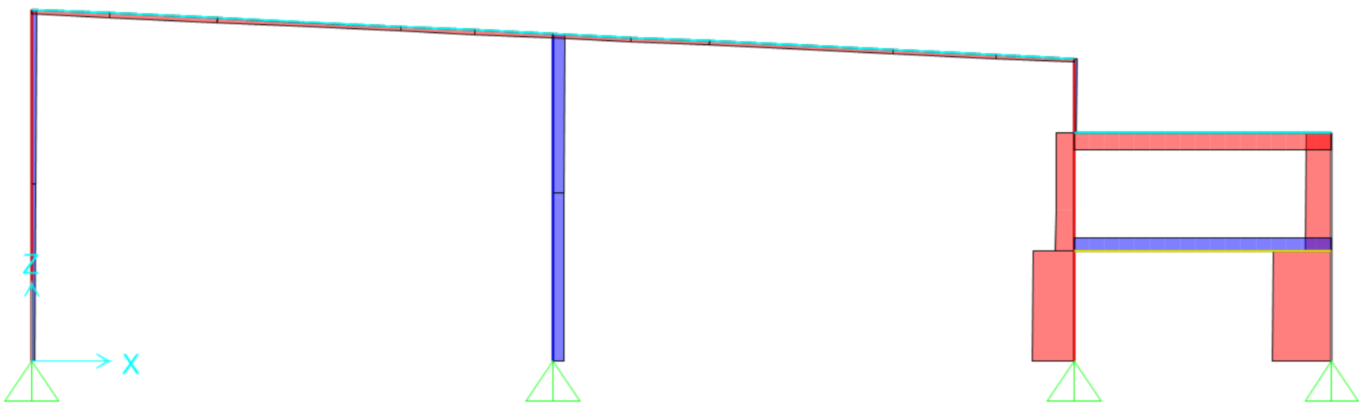
MOMENT 3-3 (DL+LL)



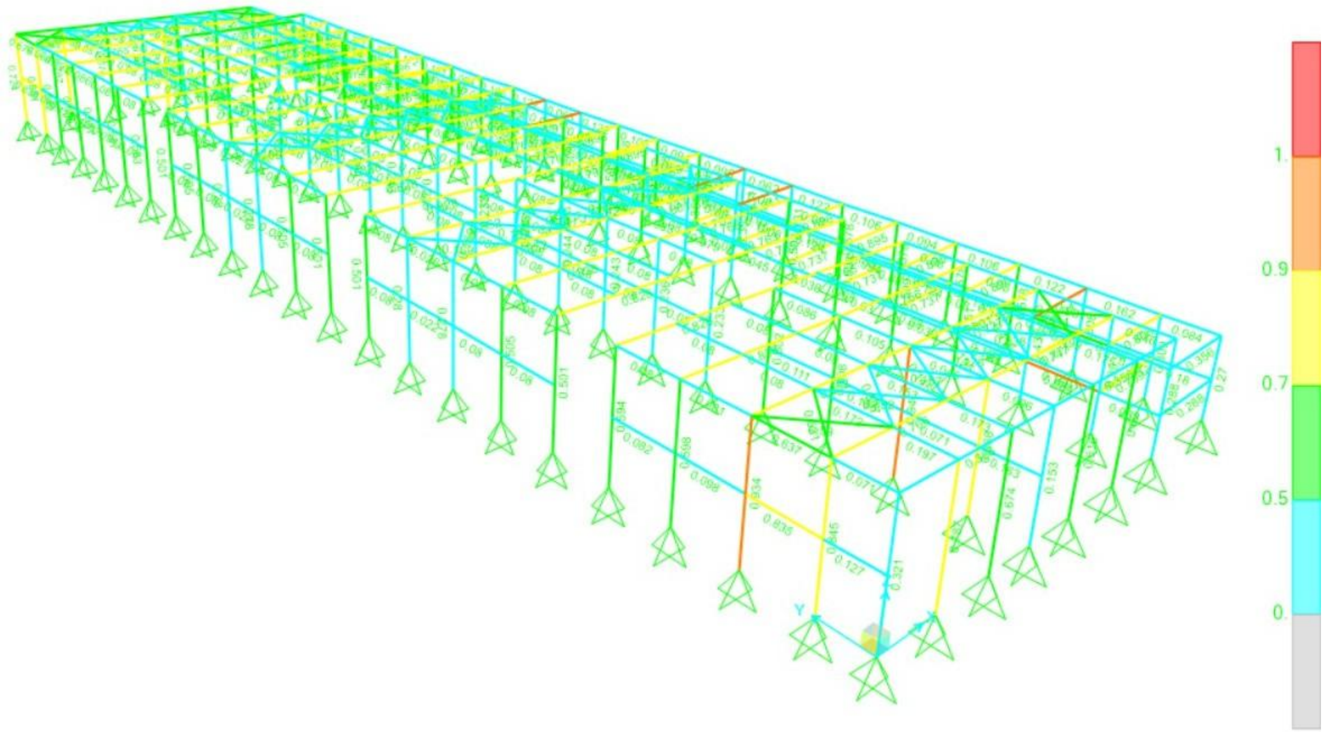
MOMENT 3-3 0.833(DL+WL)

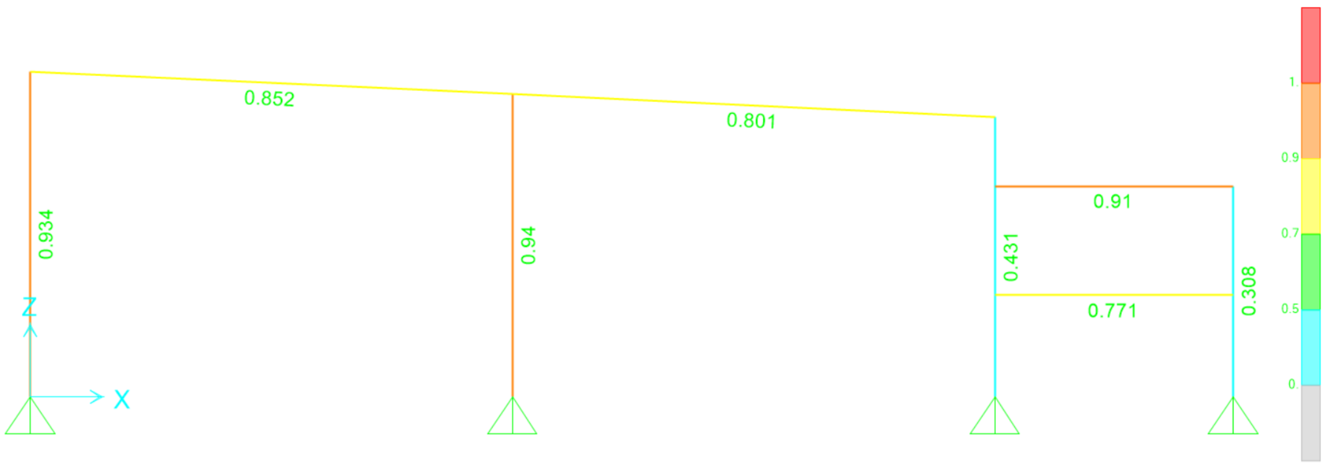


AXIAL FORCE (DL+LL)



AXIAL FORCE 0.833(DL+WL)

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0.7
0.5
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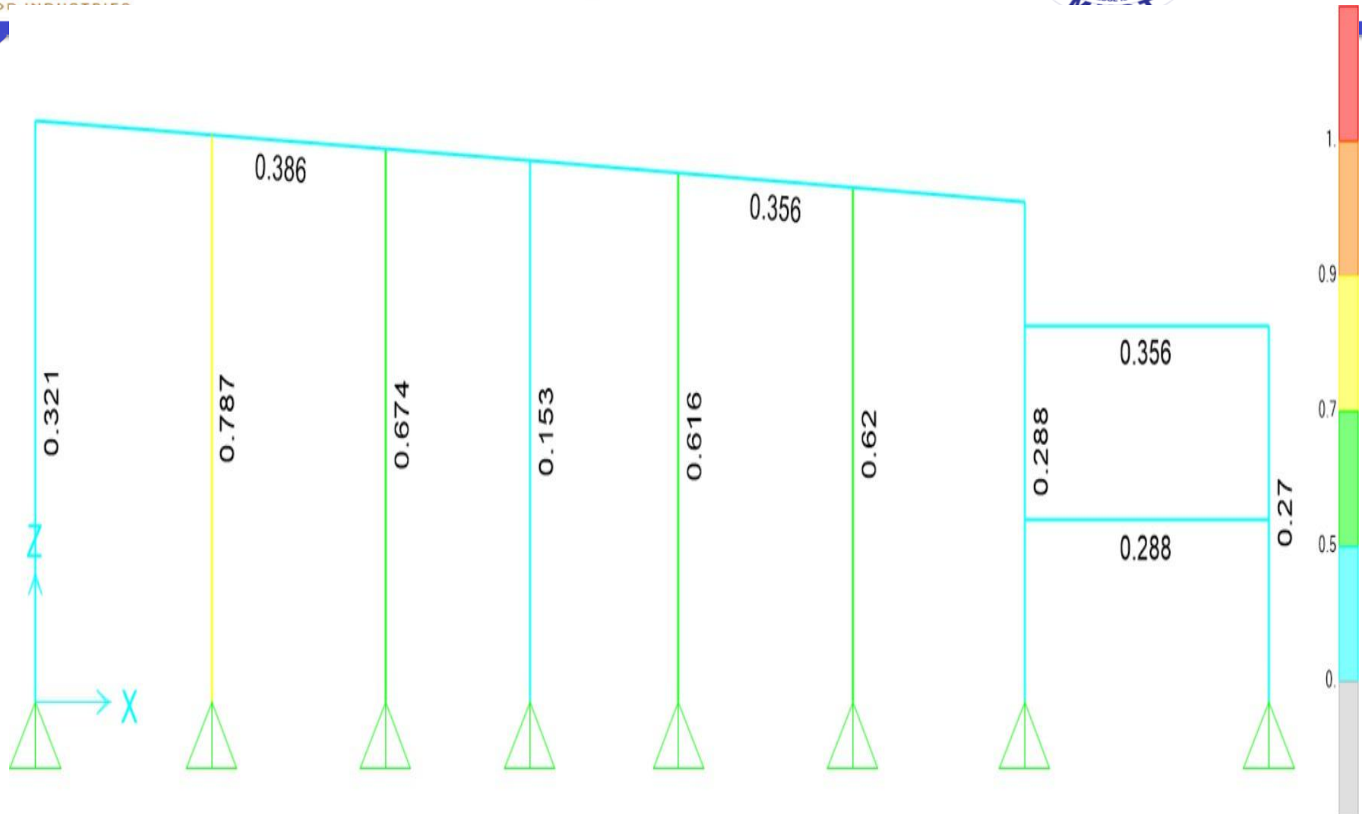
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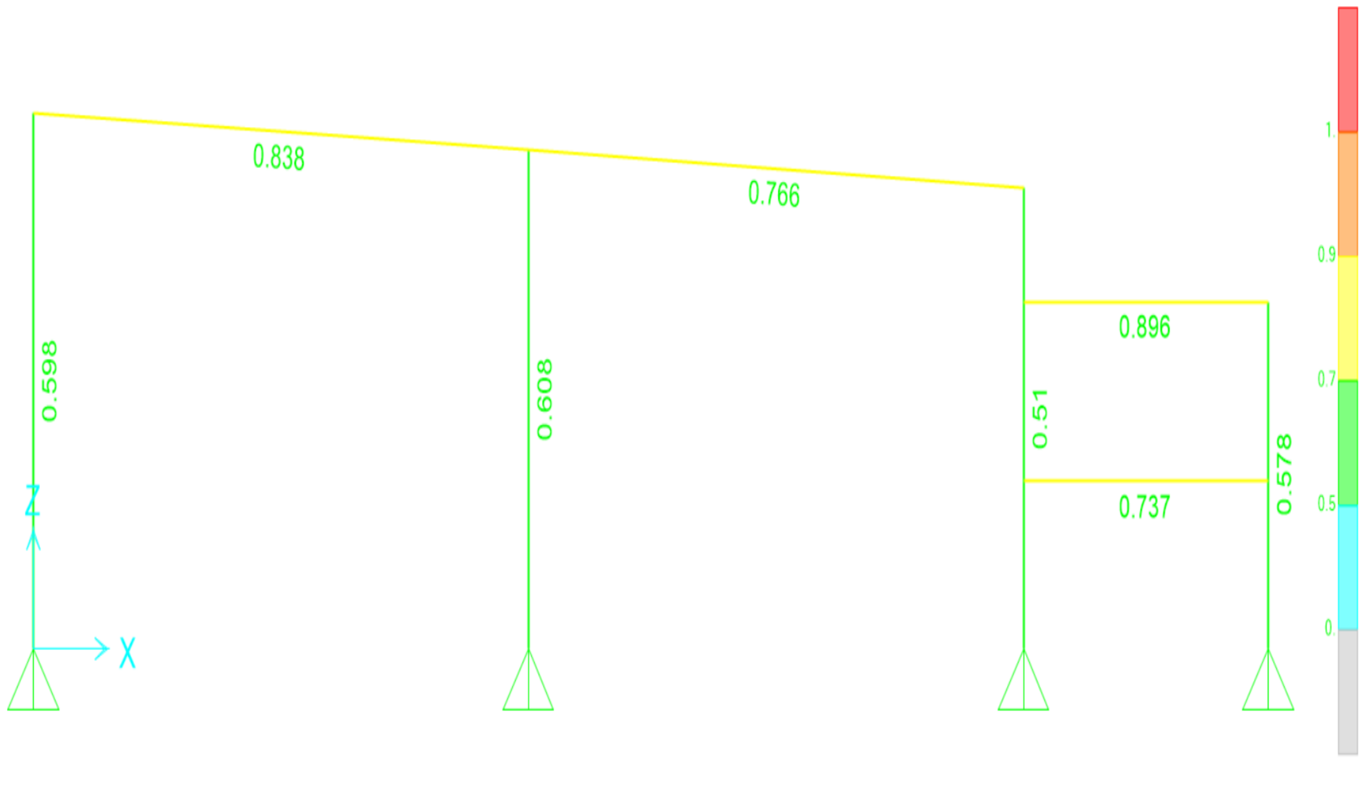
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0.

SAP DESIGN

OPTION2 (FIXED SUPPORT)

Figure 3

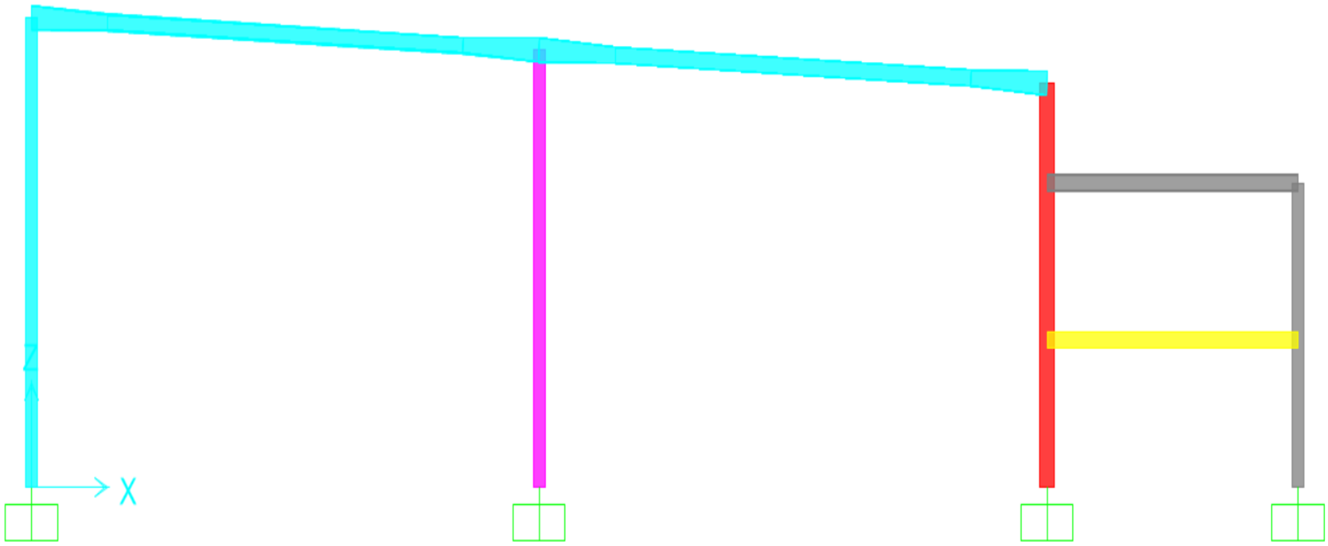


Figure 4

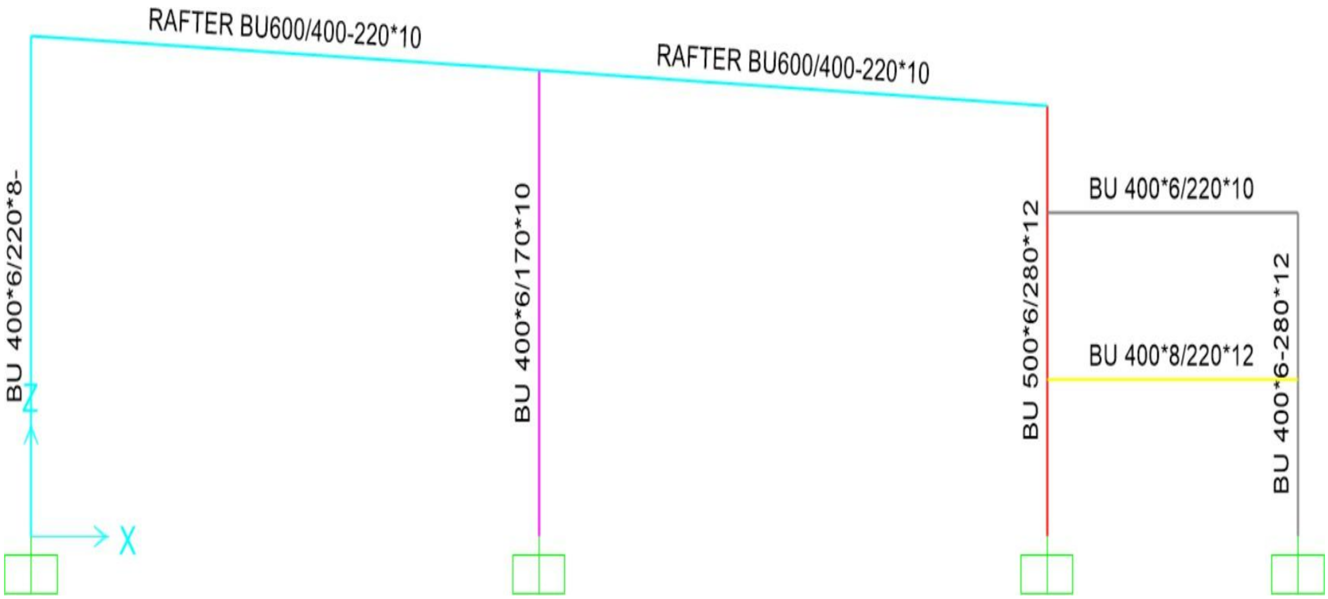


Figure 5

Material List 2 - By Section Property

File View Edit Format-Filter-Sort Select Options

Units: As Noted
Filter:

Section Text	ObjectType Text	NumPieces Unitless	TotalLength	TotalWeight Tonf
BU 250*5/10...	Frame	54	316.125	6.874
BU 300*5/17...	Frame	16	97.4	3.67
BU 400*5/14...	Frame	18	105.375	5.2279
BU 400*6/17...	Frame	23	246.1	10.9731
BU 400*6/22...	Frame	15	172.5	7.8864
BU 400*6/22...	Frame	23	193.775	10.1612
BU 400*6-2...	Frame	15	111.75	7.8741
BU 400*8/22...	Frame	23	193.775	12.6072
BU 500*6/21...	Frame	16	97.4	5.4133
BU 500*6/28...	Frame	15	148.5	11.163
BU(3I) 400*...	Frame	8	59.6	17.2135
BU(3I) 500*...	Frame	8	79.2	17.8608
COL	Frame	8	92	8.5364
EG 250*5/15...	Frame	8	85.57185	2.3981
RAFTER BU...	Frame	46	785.16287	37.7972
SHS 100*10...	Frame	203	1308.43439	15.7766

Record: << < 1 > >> of 16

Figure 6

Material List 2 - By Section Property

File View Edit Format-Filter-Sort Select Options

Units: As Noted
Filter:

Section Text	ObjectType Text	NumPieces Unitless	TotalLength	TotalWeight Tonf
BU 250*5/10...	Frame	54	316.125	6.874
BU 300*5/17...	Frame	16	97.4	3.67
BU 400*5/14...	Frame	18	105.375	5.2279
BU 400*6/22...	Frame	23	193.775	10.1612
BU 400*6-2...	Frame	15	111.75	7.8741
BU 400*8/22...	Frame	23	193.775	15.187
BU 500*6/21...	Frame	16	97.4	5.4133
BU 500*6/28...	Frame	15	148.5	11.163
BU(3I) 400*...	Frame	8	59.6	17.2135
BU(3I) 500*...	Frame	8	79.2	17.8608
COL	Frame	8	92	8.5364
EG 250*5/15...	Frame	8	85.57185	2.3981
RAFTER BU...	Frame	46	785.16287	42.2818
SHS 100*10...	Frame	203	1308.43439	15.7766
VAR 600/40...	Frame	23	246.1	11.7922
VAR 600/40...	Frame	15	172.5	9.858

Record: << < 1 > >> of 16

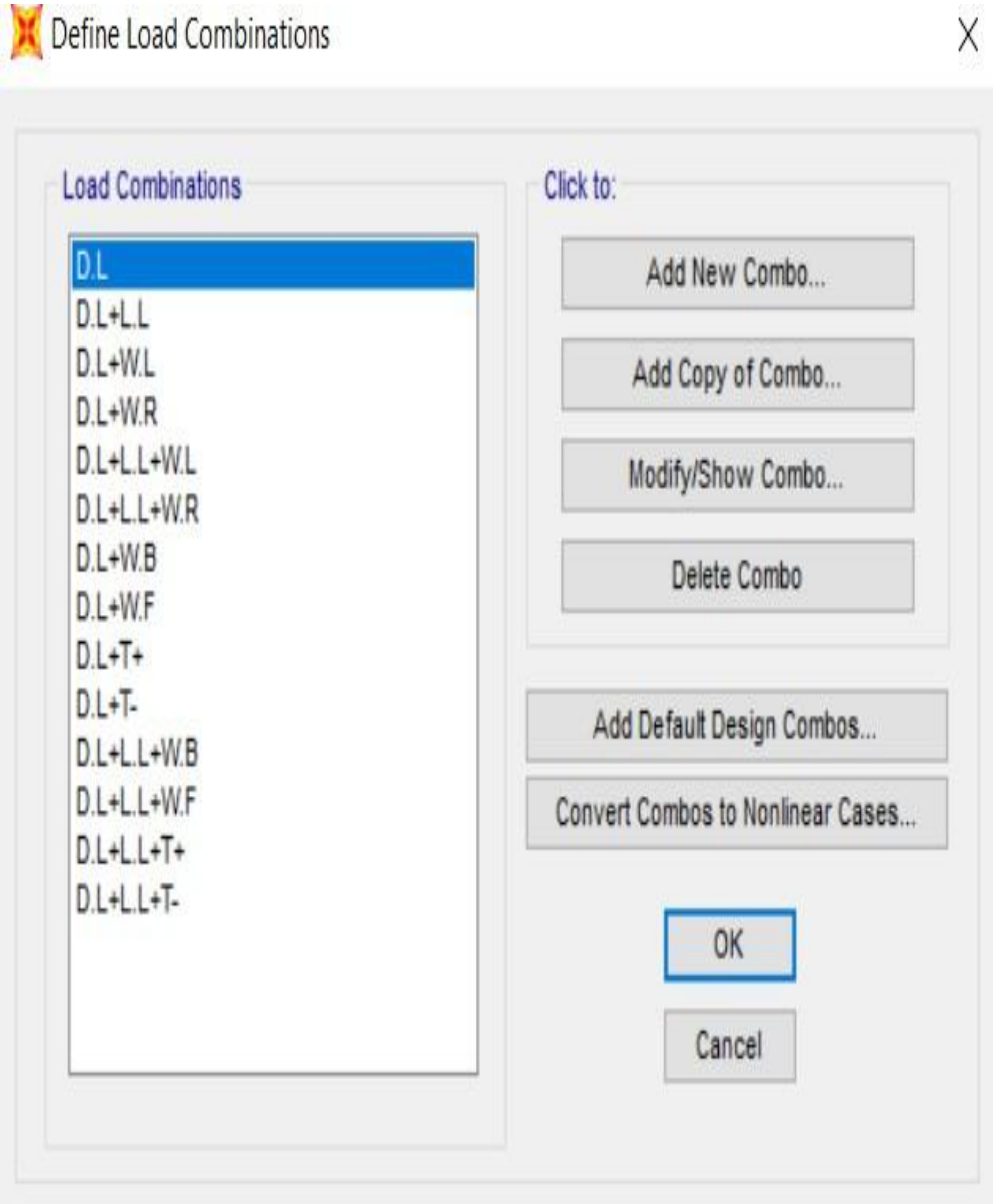
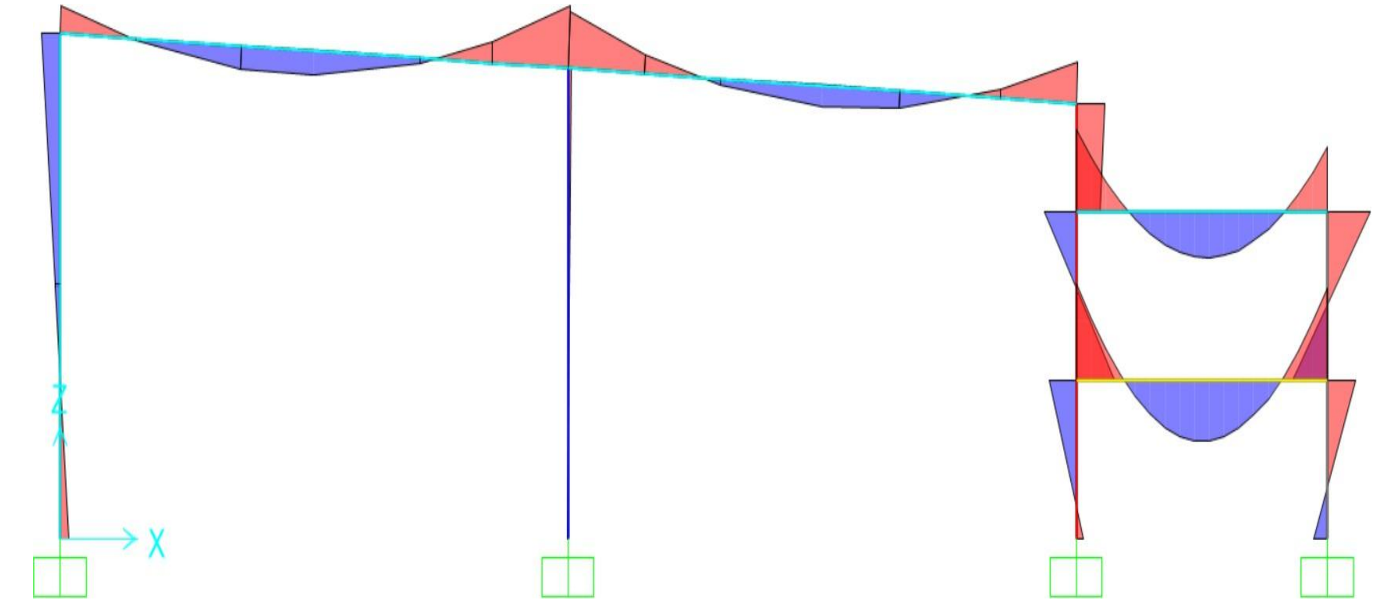
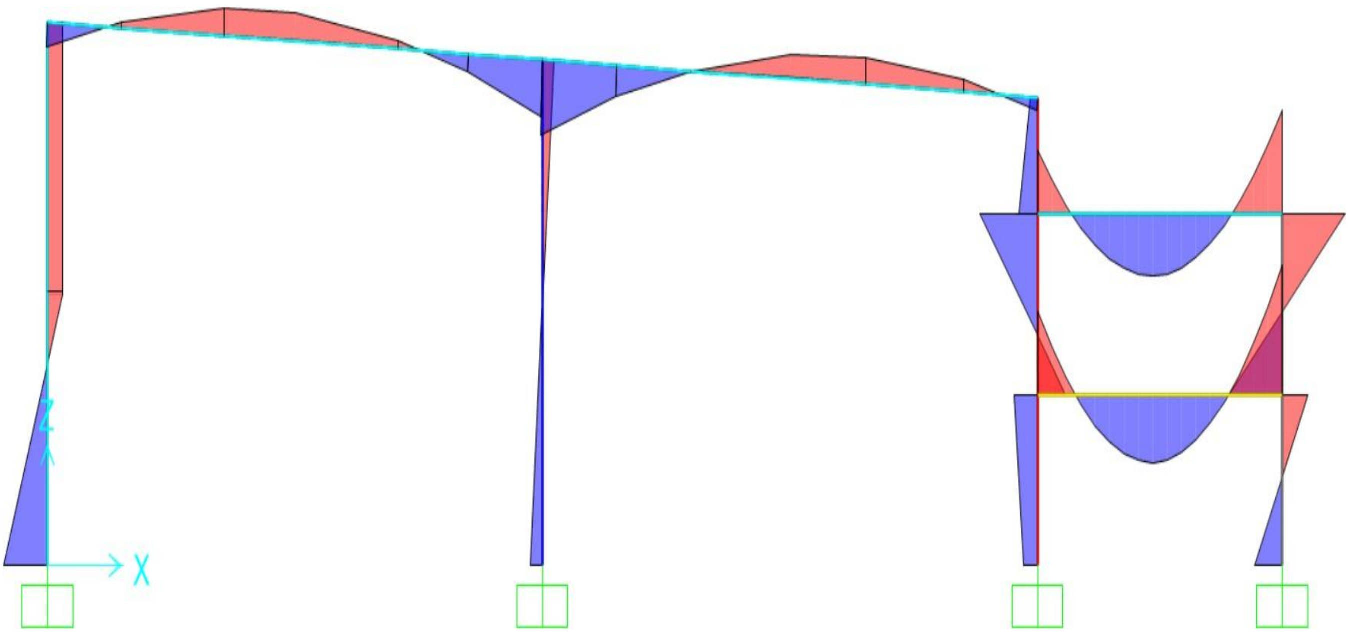

Define Load Combinations
X
Load Combinations
D.L
D.L+L.L
D.L+W.L
D.L+W.R
D.L+L.L+W.L
D.L+L.L+W.R
D.L+W.B
D.L+W.F
D.L+T+
D.L+T-
D.L+L.L+W.B
D.L+L.L+W.F
D.L+L.L+T+
D.L+L.L+T-
Click to:
Add New Combo...
Add Copy of Combo...
Modify/Show Combo...
Delete Combo
Add Default Design Combos...
Convert Combos to Nonlinear Cases...
OK
Cancel

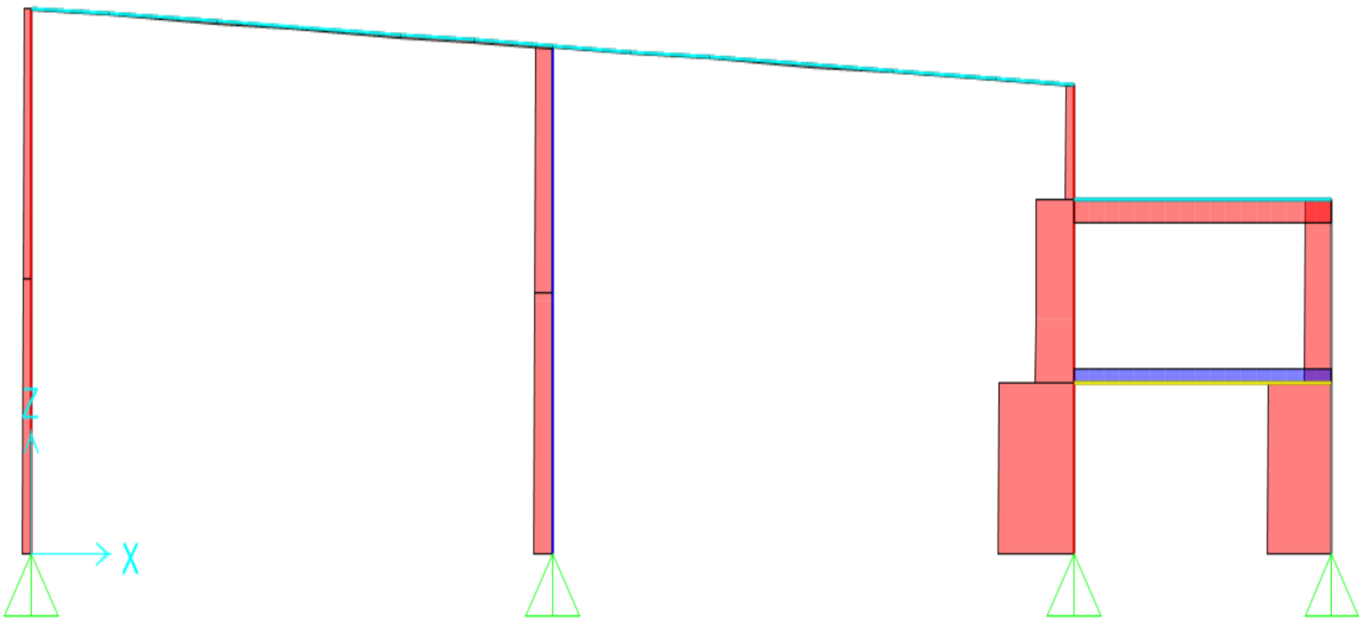
Figure 4



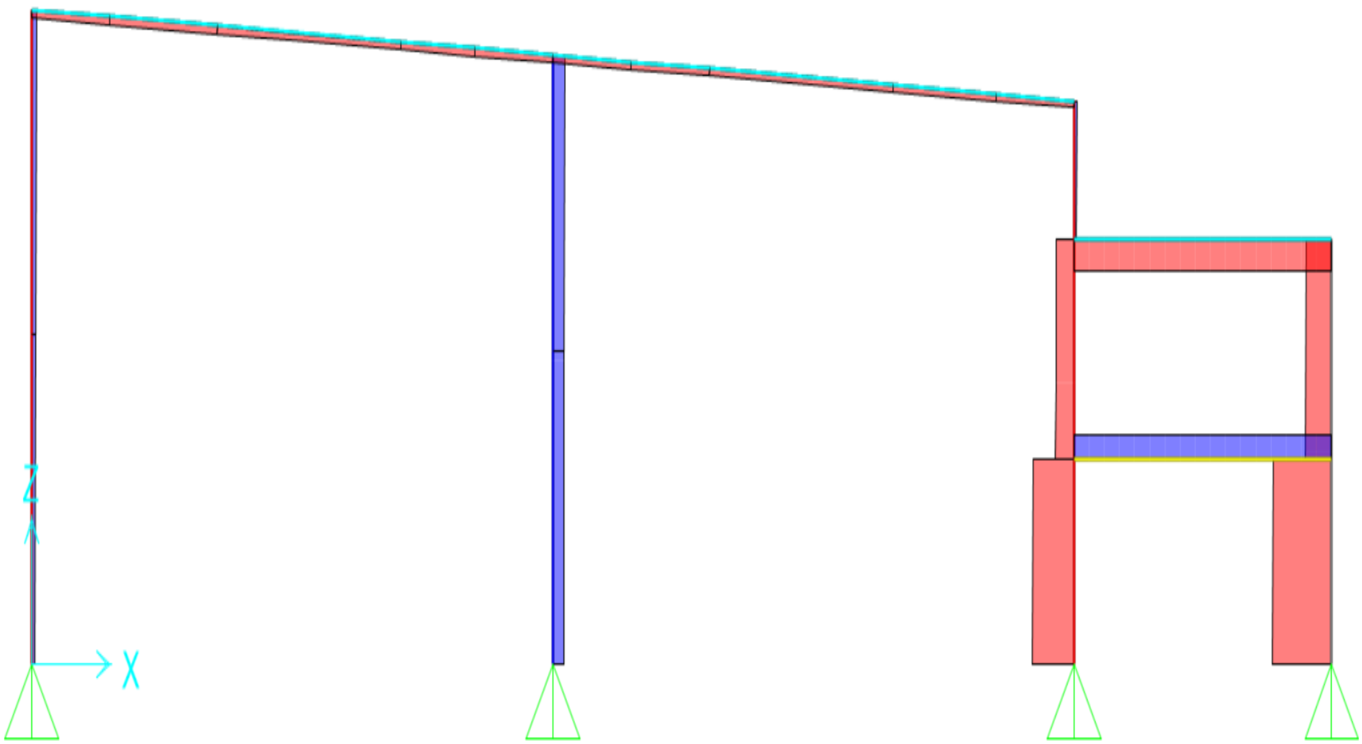
MOMENT 3-3 (DL+LL)



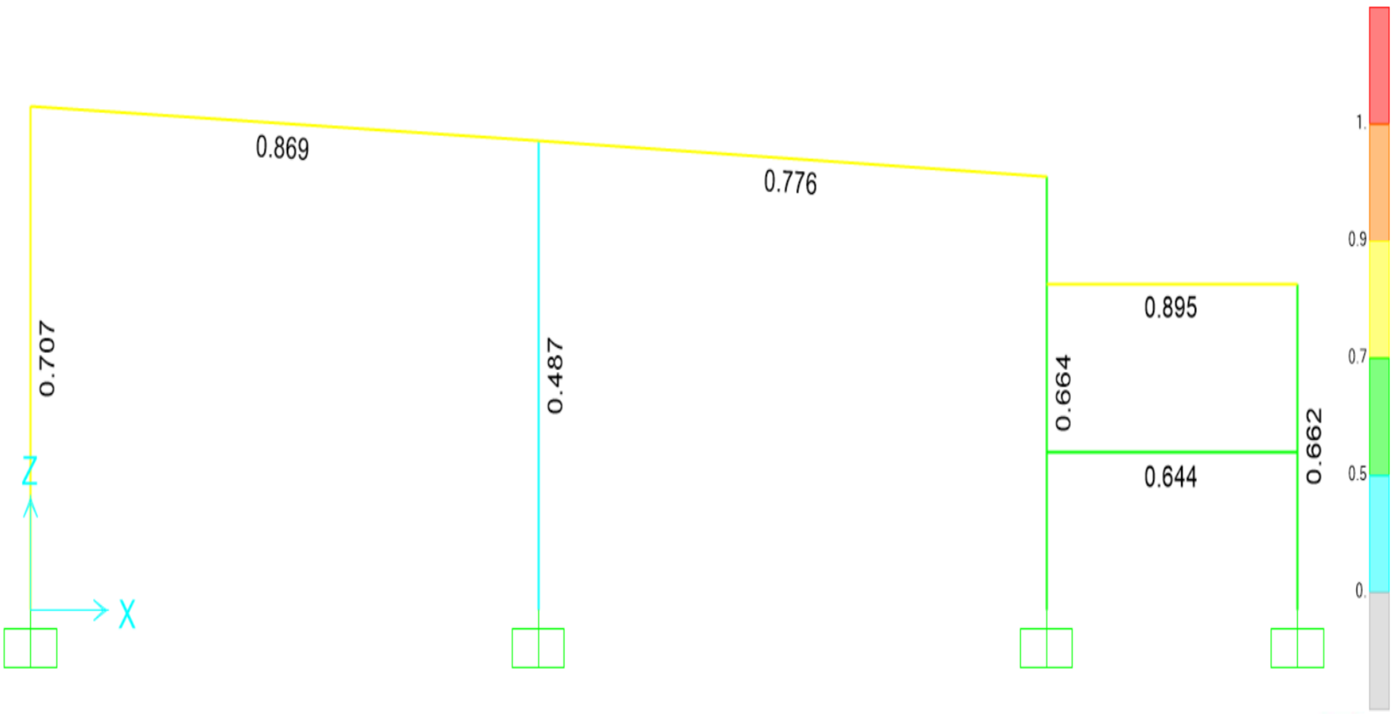
MOMENT 3-3 0.833(DL+WL)



AXIAL FORCE (DL+LL)



AXIAL FORCE 0.833(DL+WL)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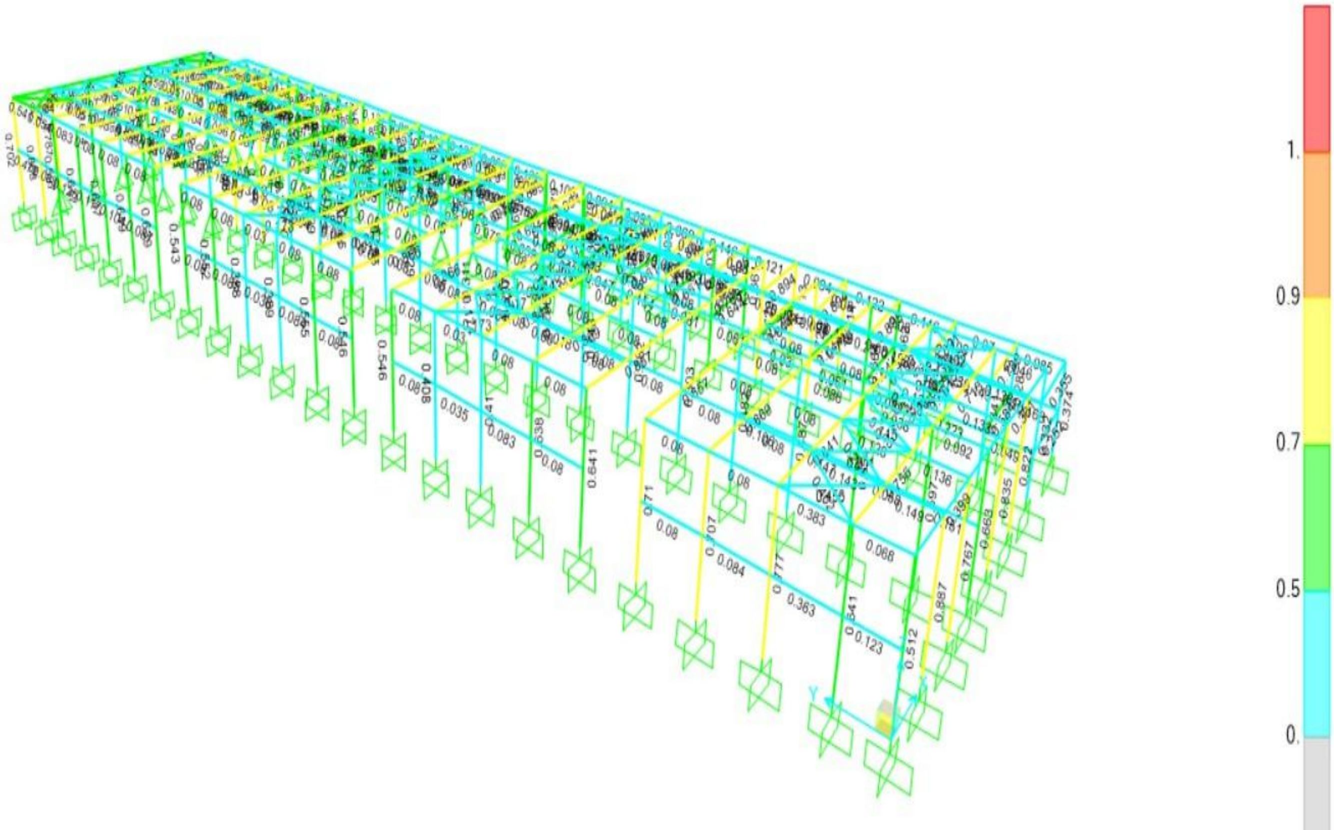
0.644
0.707
0.487
0.664
0.662
Z
X
1.
0.9
0.7
0.5
0.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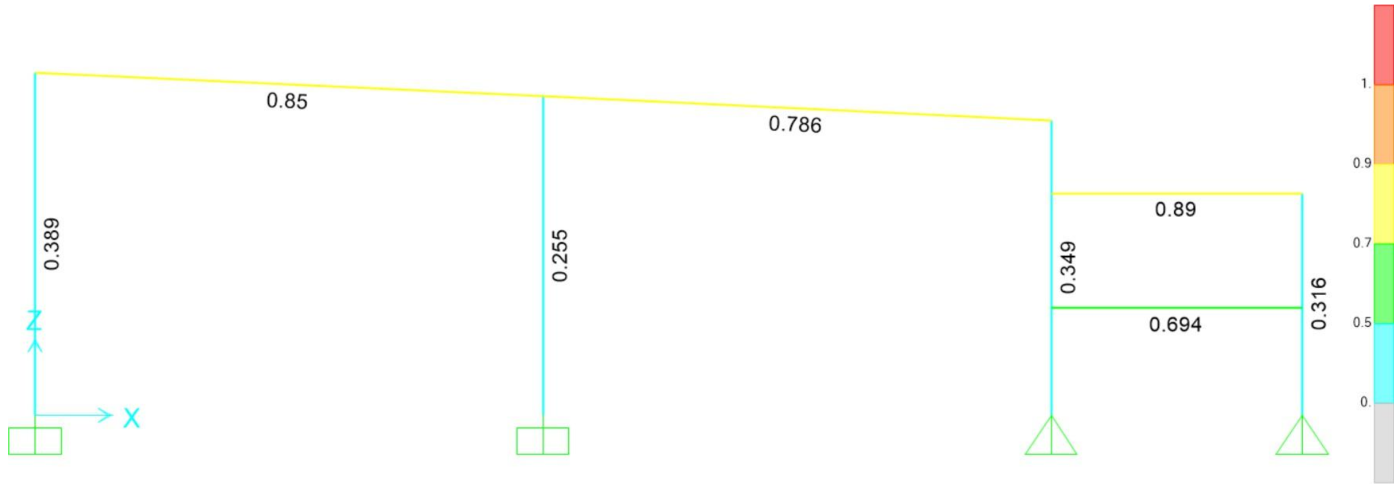
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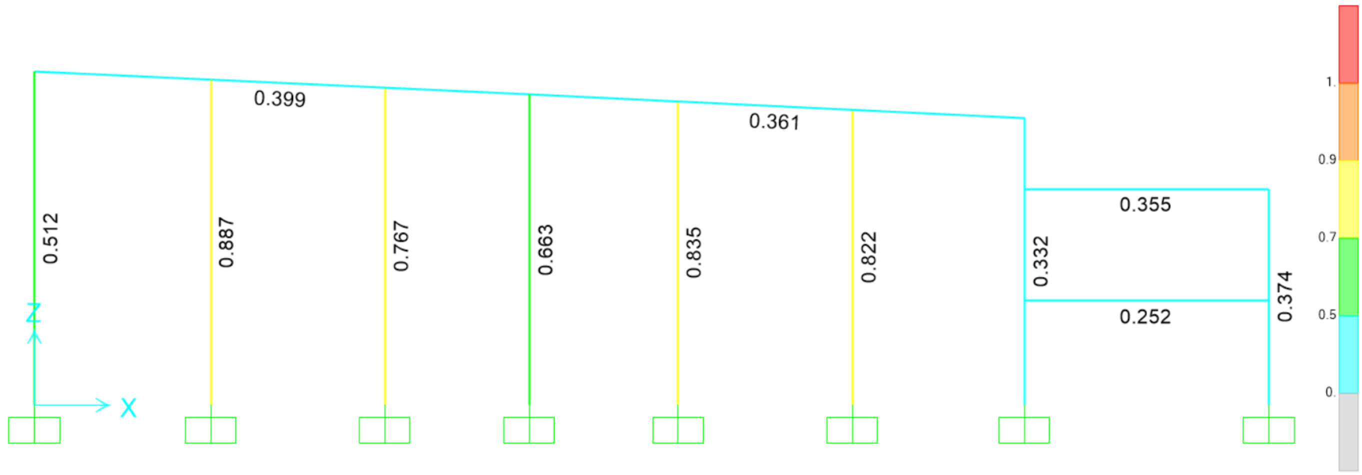
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0.663
0.835
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Z
X
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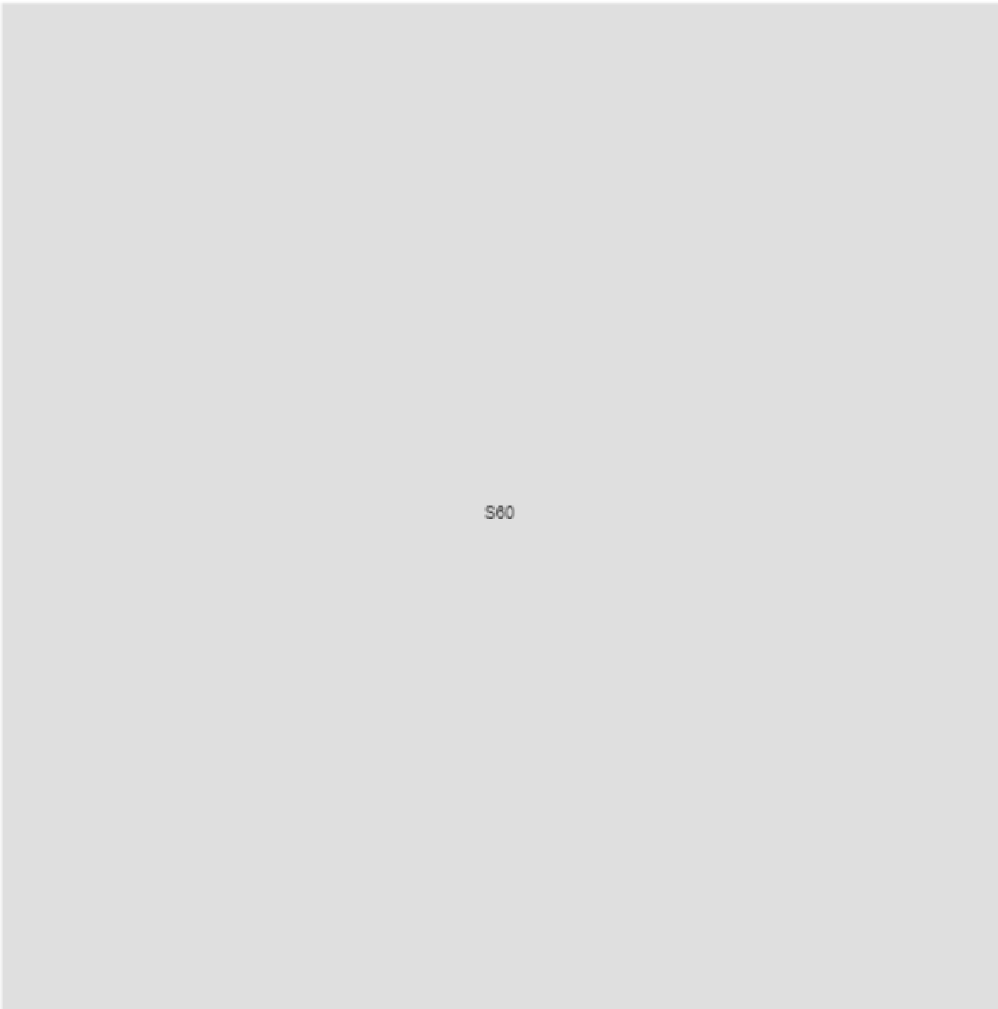
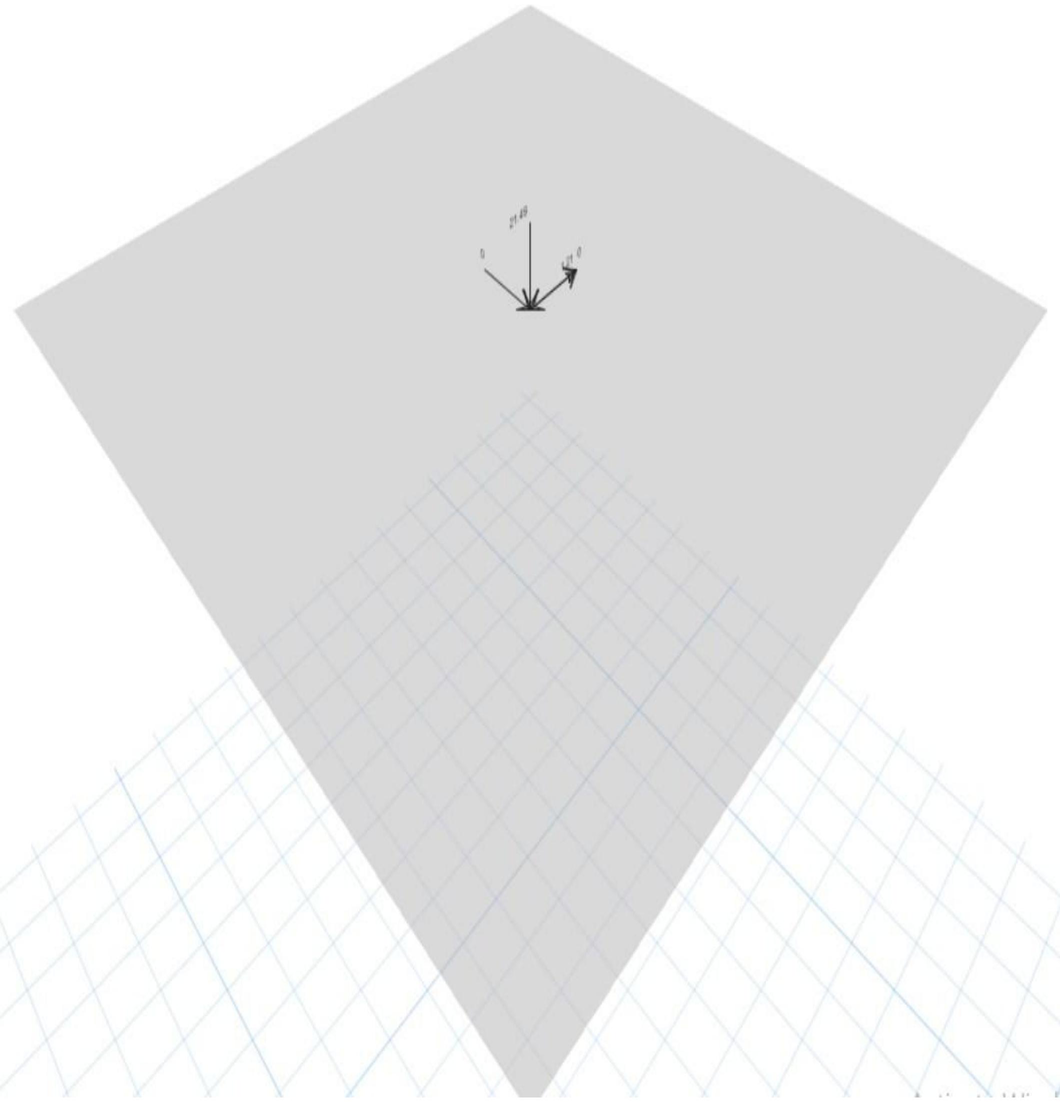
0.9
0.7
0.5
0.

SAP DESIGN

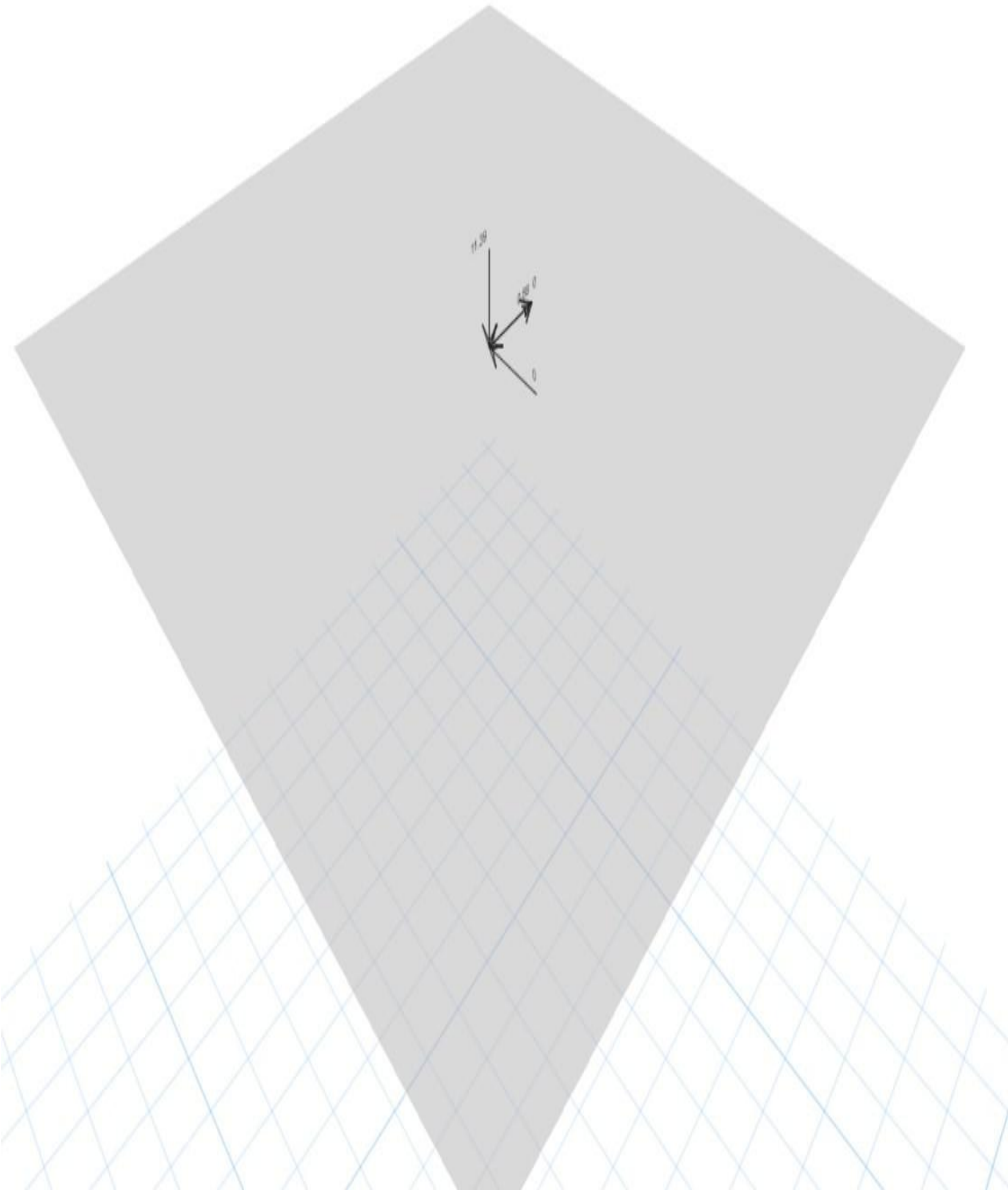
ESIGN ISOLATED FOOTING



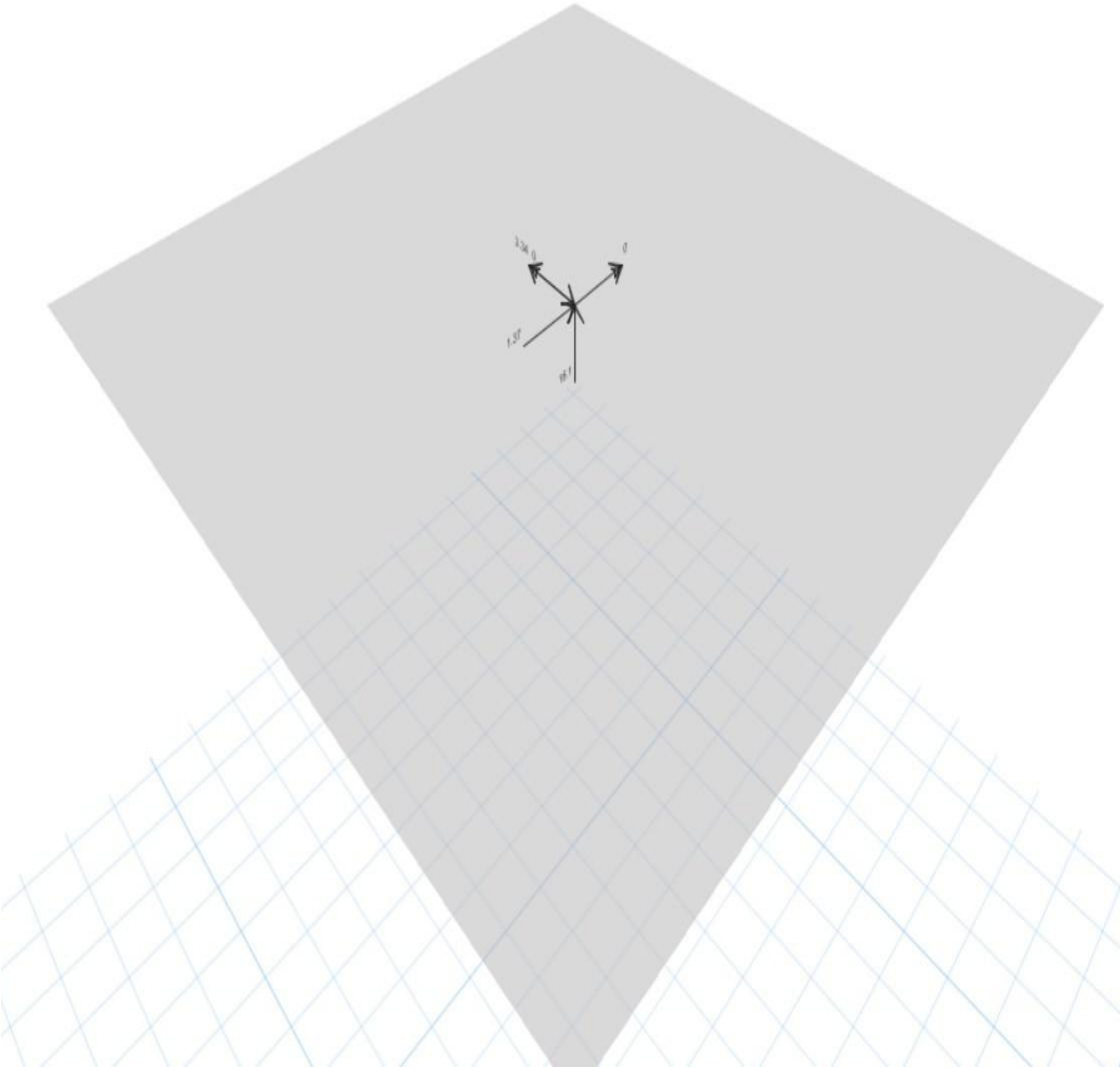
SECTIONS (2.50x2.50x0.6m)



DEAD-ABOVE LOADS

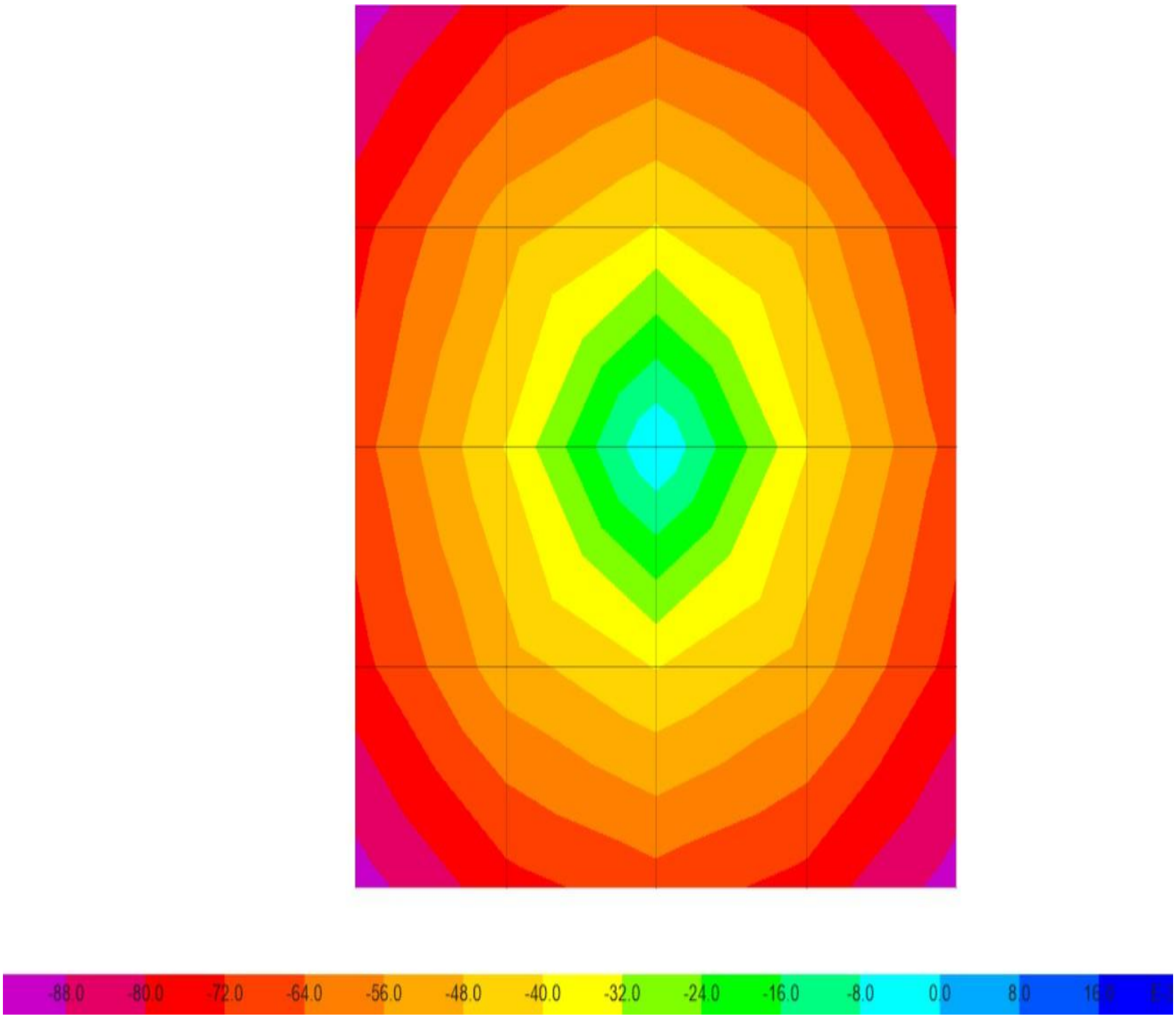


LIVE-ABOVE LOADS



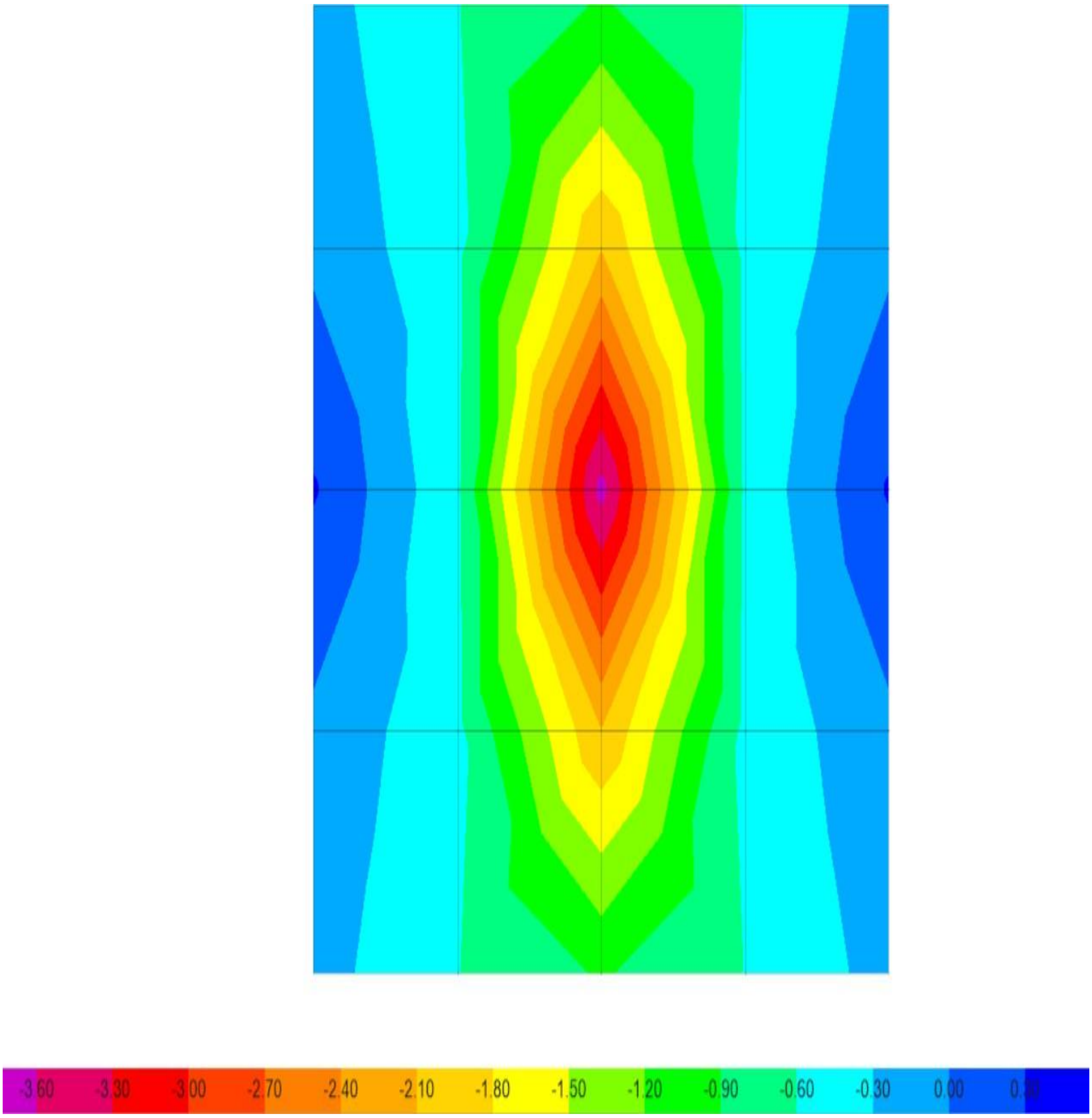
WIND-ABOVE LOADS

CHECK BEARING CAPICTY



(DL+LL) (0.25 T/m^2) ≤ 15 T/m^2

DESIGN REINFORCEMENT



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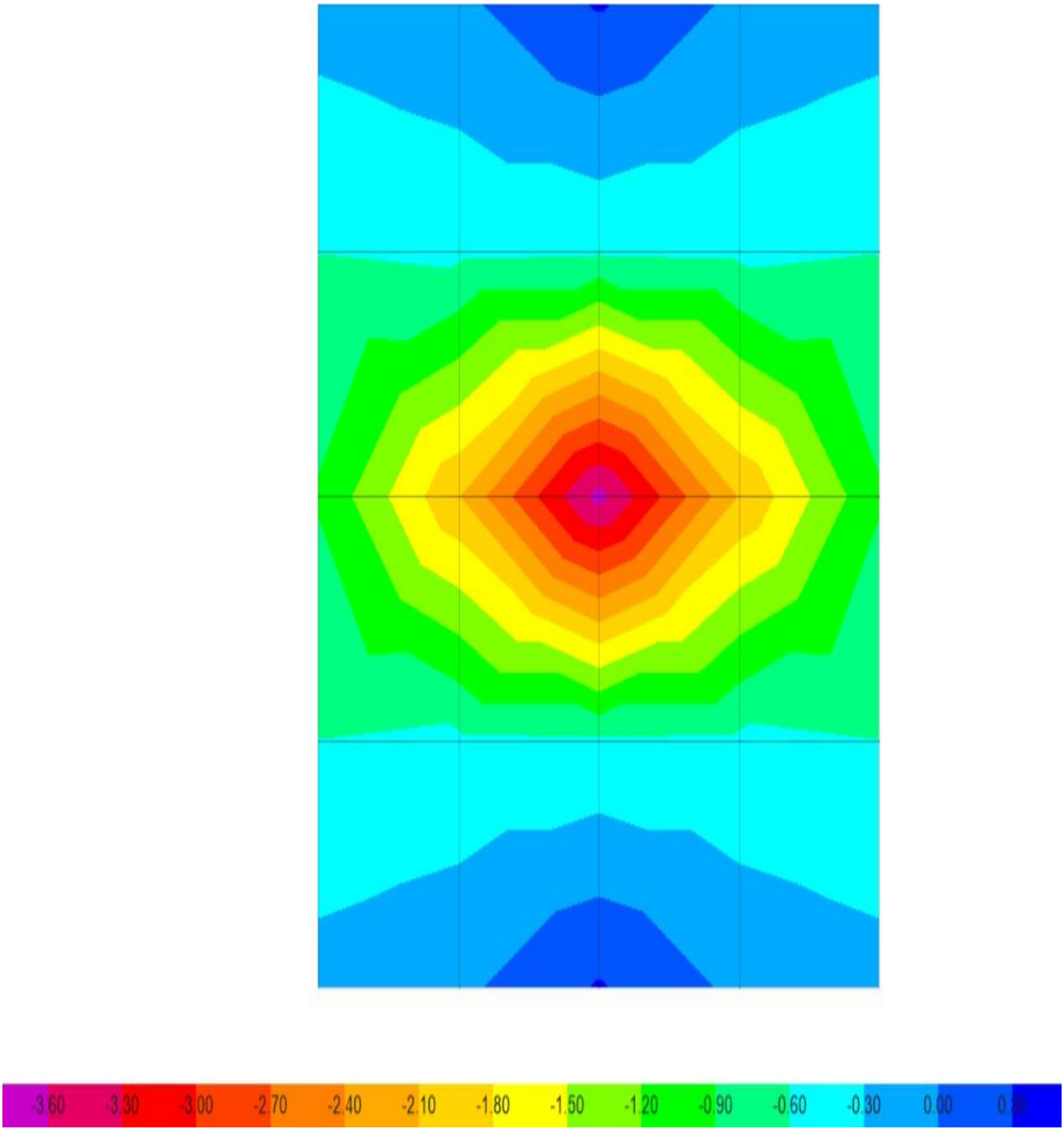
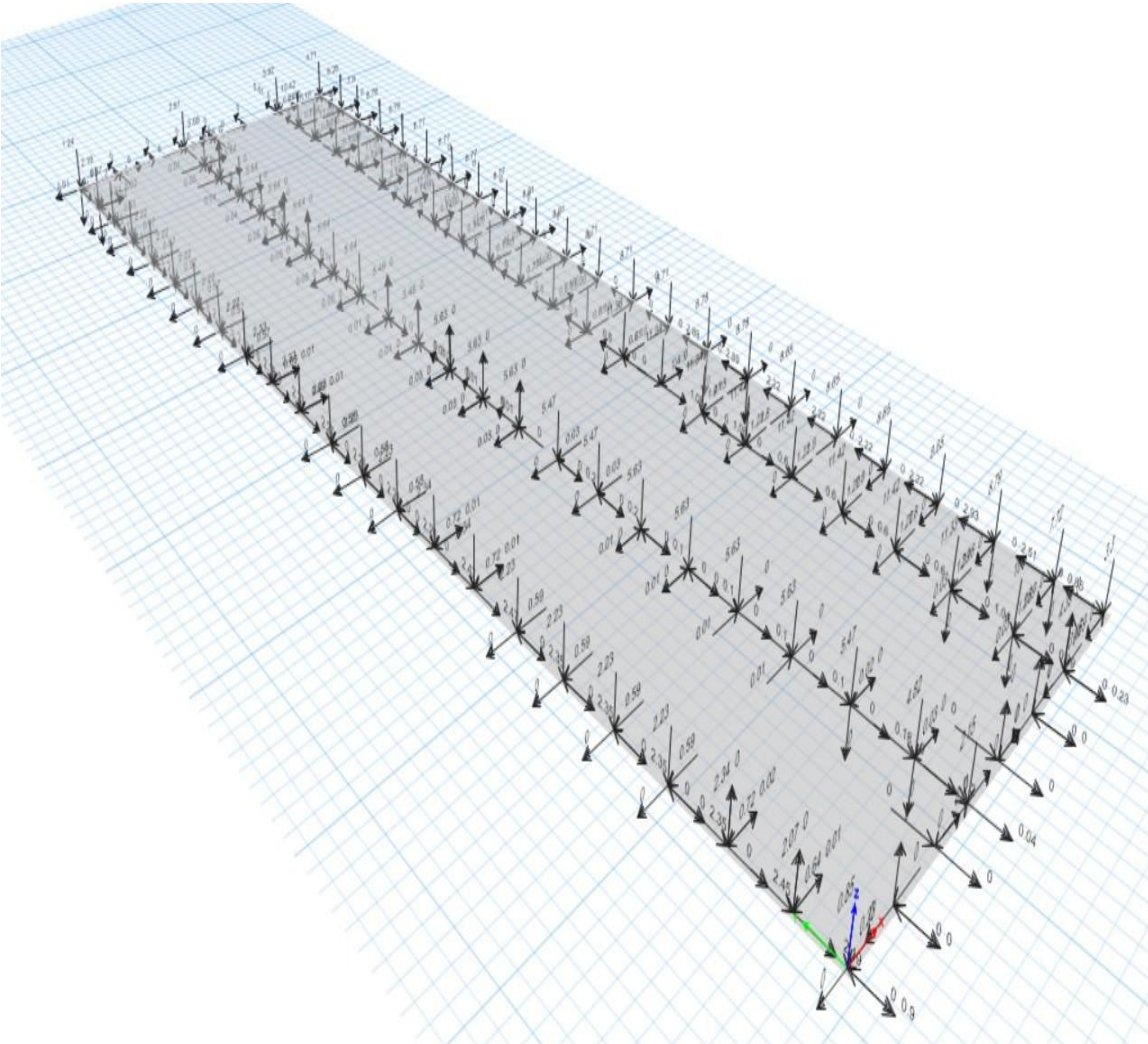


(DL+LL) (M22=3.66) USE REINFORCEMENT = 7Y12/m

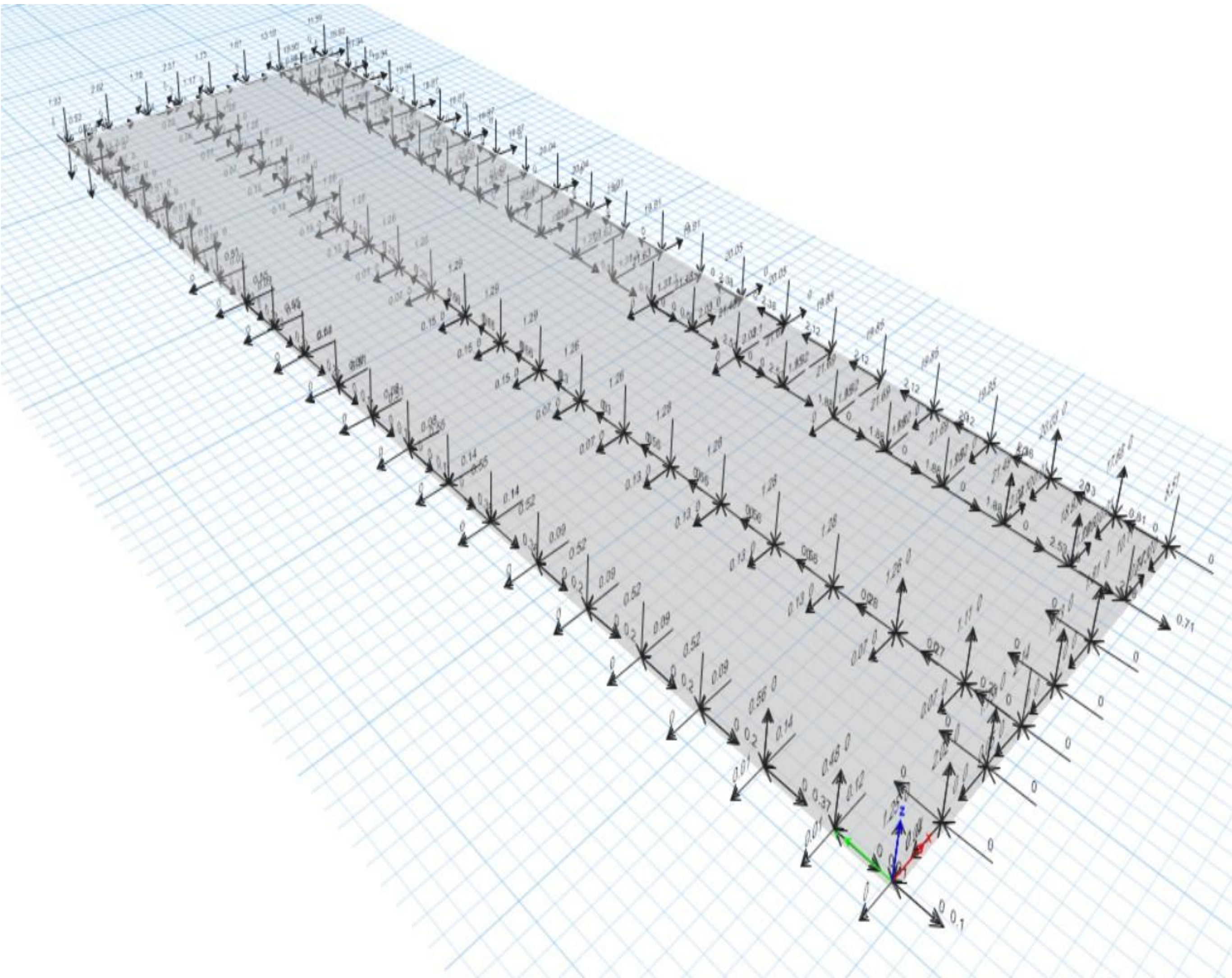
ESIGN RAFT

SECTIONS

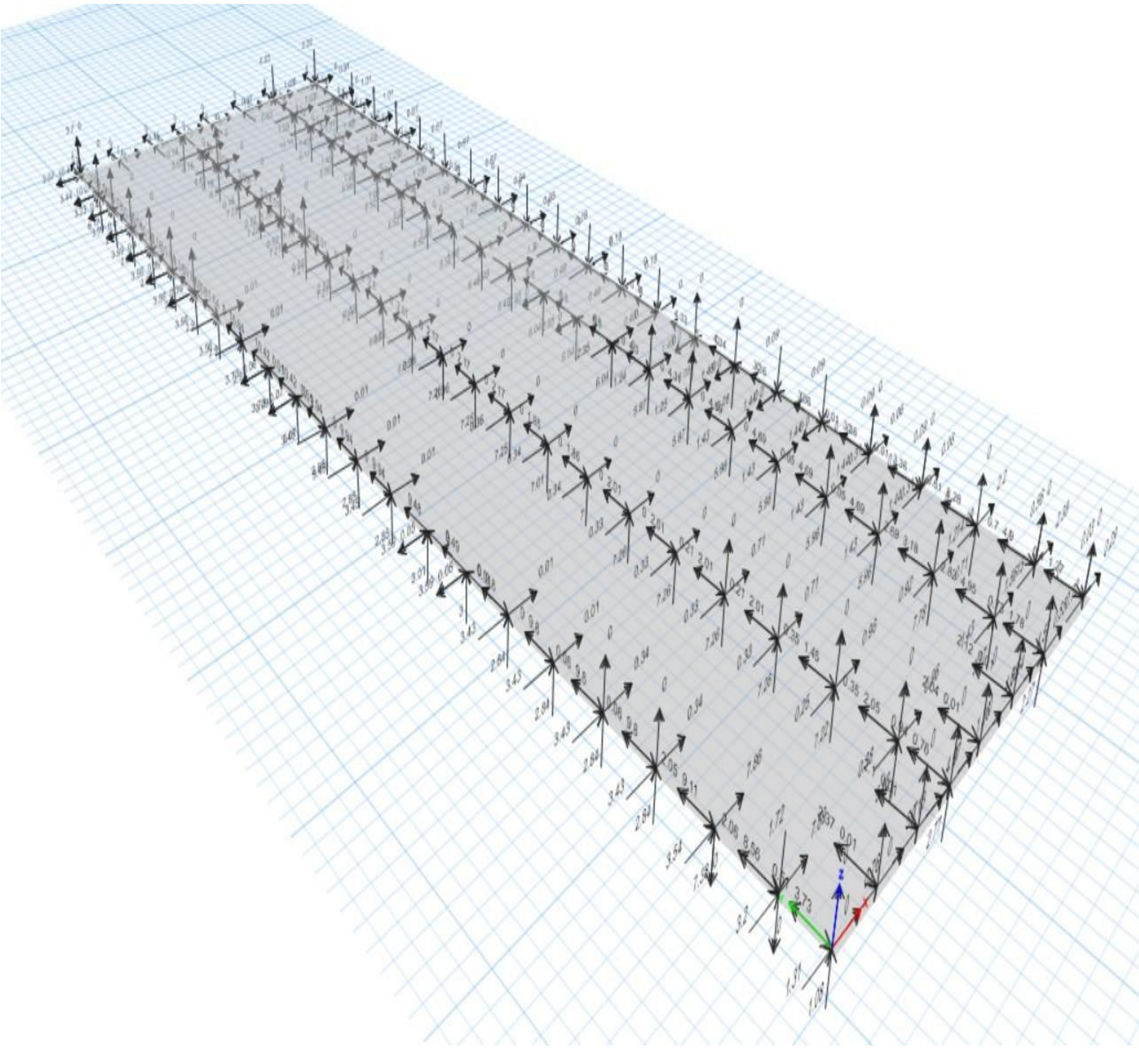
DEAD-ABOVE LOADS



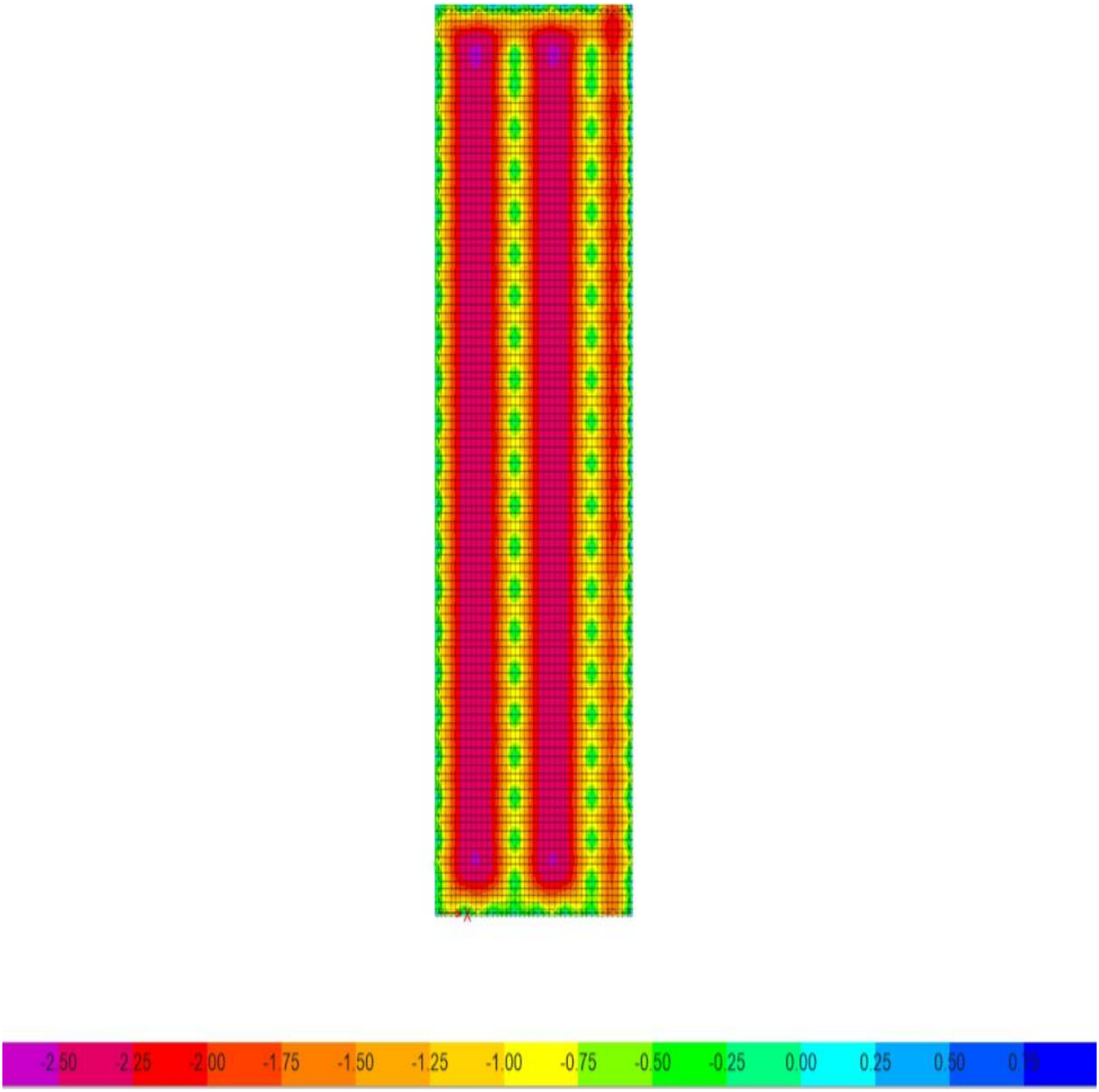
LIVE-ABOVE LOADS



WIND-ABOVE LOADS

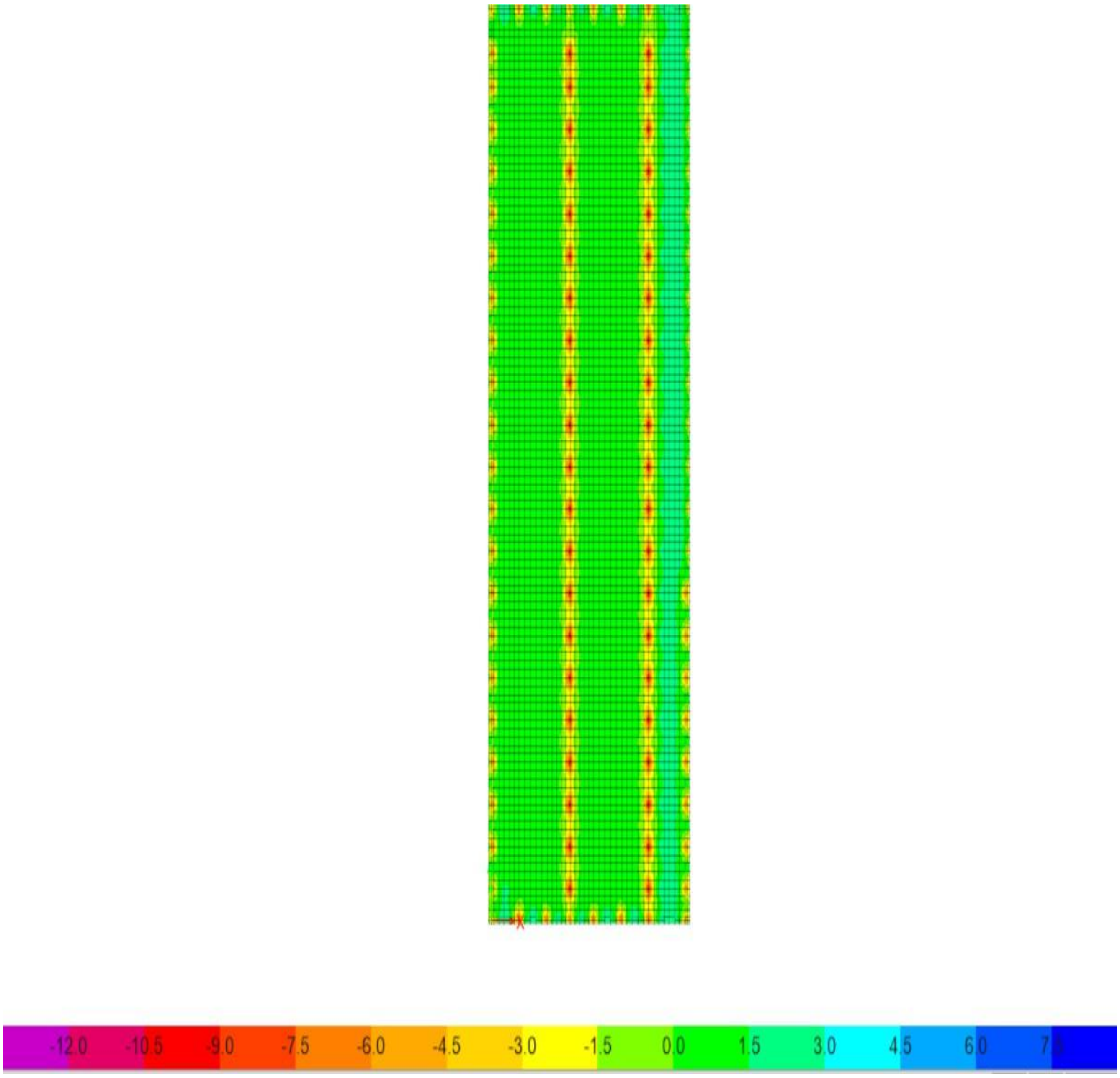


CHECK BEARING CAPICTY

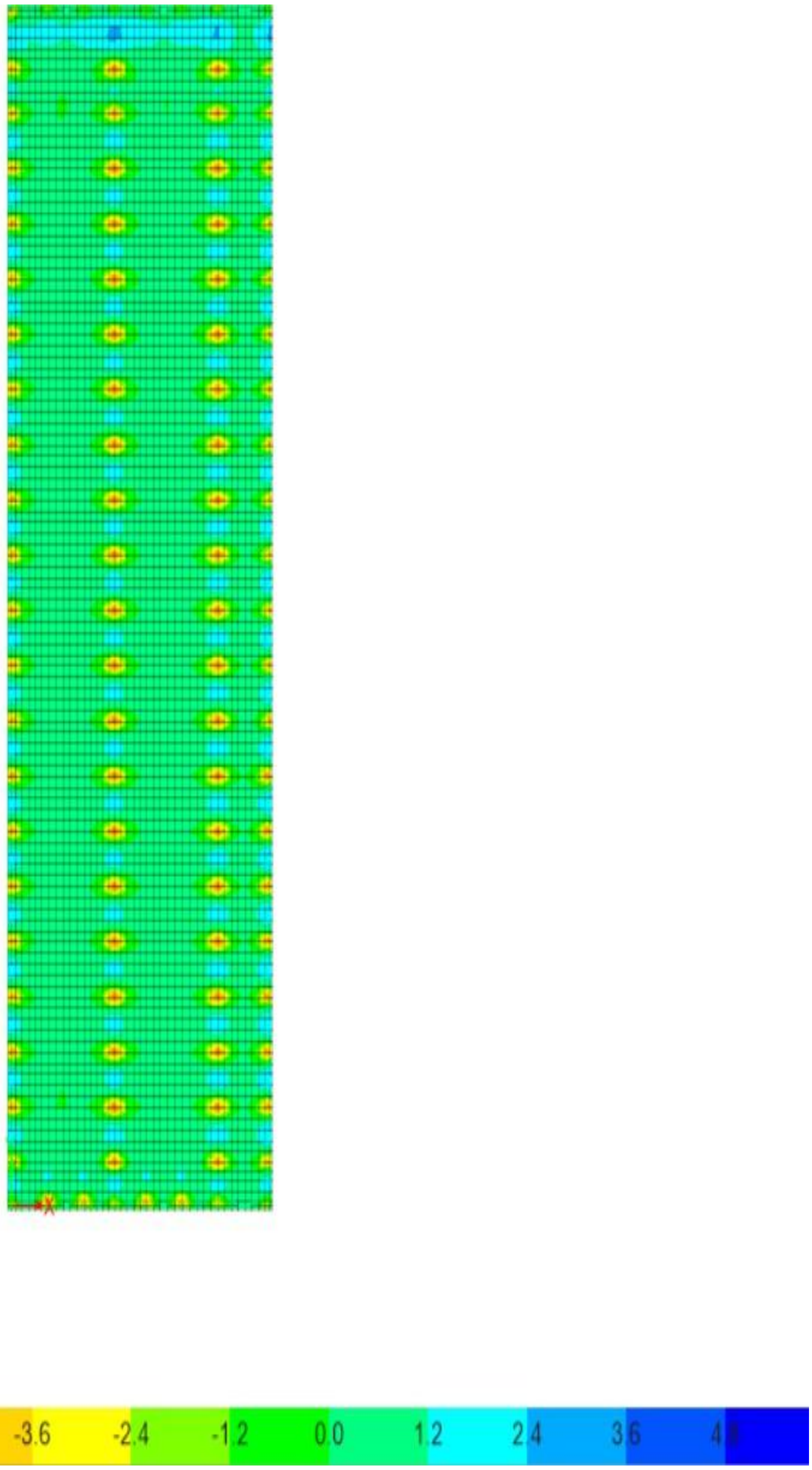


(DL+LL) (2.25 T/m^2) ≤ 15 T/m^2

DESIGN REINFORCEMENT



(DL+LL) (M11=10.5) USE REINFORCEMENT = 8Y16/m



(DL+LL) (M22=7.66) USE REINFORCEMENT = 8Y16/m

10.4-Conclusion:-

If the Isolated footing is used, the concrete footing are reduce and reinforcement due to the bending of moment on it Figure 1 ,

but the steel structure is increased Figure 6 , and the variable columns are used Figure 2 because of the hinge base is used .

However, when using Raft foundation, not variable columns must be used because of the bending of the moment Figure 3,

and the concrete footing becomes larger and more reinforcement because of the bending of the moment on the end columns Figure 4 but the steel structure is reduced Figure 5.

Chapter (11)

Building Information Modeling (BIM)

Chapter 11: Building Information Modeling (BIM)

11.1 –Introduction

Building Information Model (BIM) is a process consisting of generating and managing digital renderings of a building’s functional and physical features, it is an integrated process built on coordinated, reliable information about a project from design through construction and into operations.

Building Information Model (BIM) consists of a 3D project model linking design, planning, construction, and operation. The BIM idea arises from the object-oriented parametric modelling technique.

The term parametric‖ defines a procedure by which the assembly is automatically adjusted to preserve a previously found relationship. The main difference between BIM conventional 3D and CAD technology is that the latter labels a building by independent 3D views such as elevations, plans, and sections while the former does not label in such a manner.

Owner: Designer:
Contractor and teamwork:
Construction management:

11.2 –The Benefits of BIM

Ability to make decisions in an early stage meaning it is possible to assess the design and evaluate Before the construction processes.

help ed in the work of cooperation between different parties in the work of construction (Designers, contractors, manufacturers, builders) ’ Saving time, effort and cost significantly.

Reduce the cost of the various phases of the project from the design stage through construction until delivery and even after delivery (administration of origin after the end of the construction process) Final drawings and Schemes more accurate for the project

Helps in the maintenance and rehabilitation of the building in the future

• increase the quality of design through more accurate and effective analysis

• Dramatically improves the process of cooperation and communication between the architecture & structure and MEP engineers throughout the design stage

• Ability to make “what if scenario “

• Accurate estimation of quantity takes off

• Clashes detect

• Increase productivity

• Reduce time needed to have the acceptance for change orders

• Help in site coordination plan

• Provide more accurate for (as built)

• Improve the cooperation and communication during the construction process

• Quantity takes off

• Cost estimation

• Identify clashes and prevent problems before they occur even before the construction phase, which save time and effort and cost

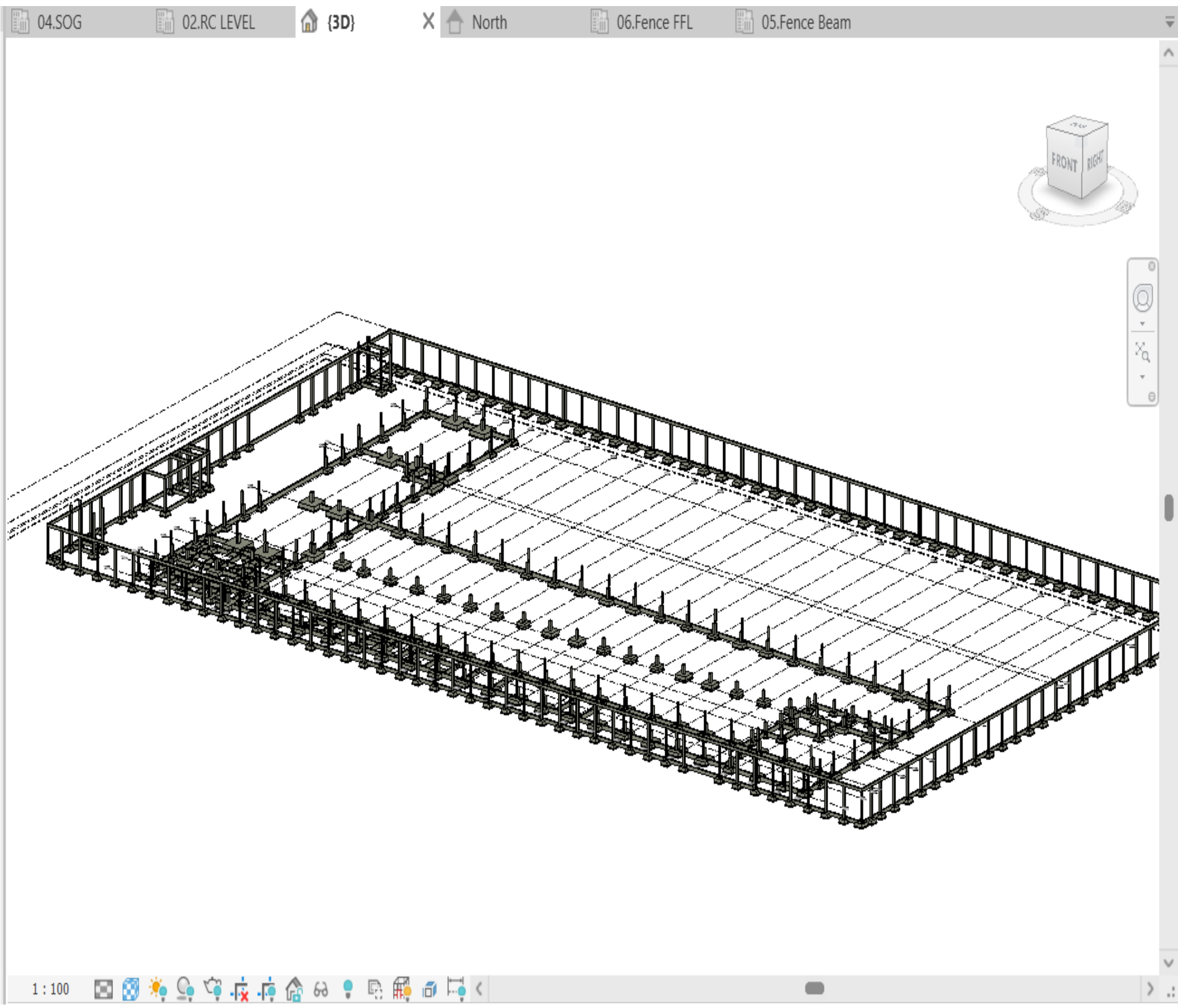
• Arrange and represent the stages of construction activities (5D simulation), which help parties for more understanding of project activities

• Good visualization with different types of media (images, walk through animation, sun path study animation)

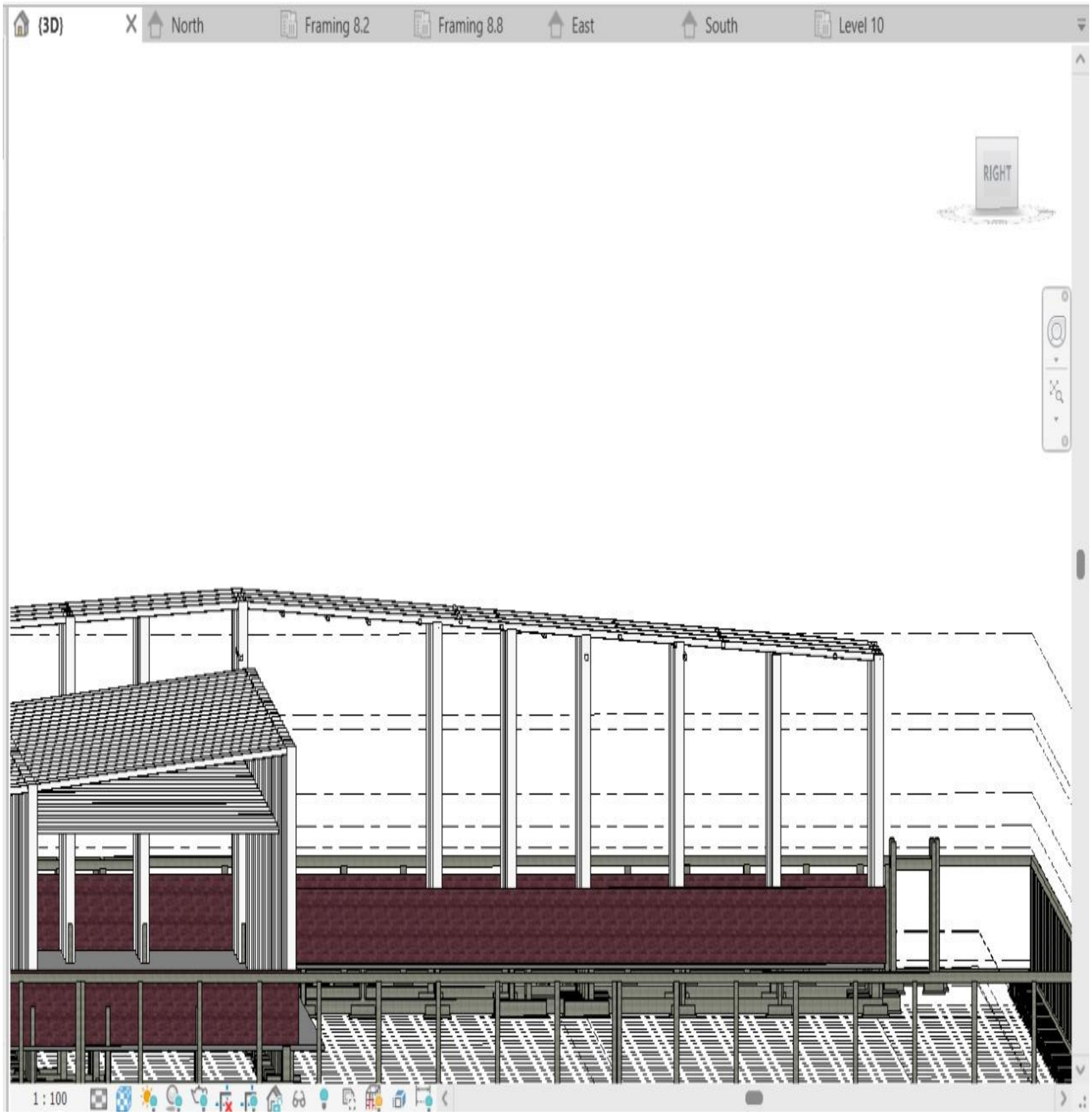
• Reduce the time needed for (shop drawings, RFIs, submittals)

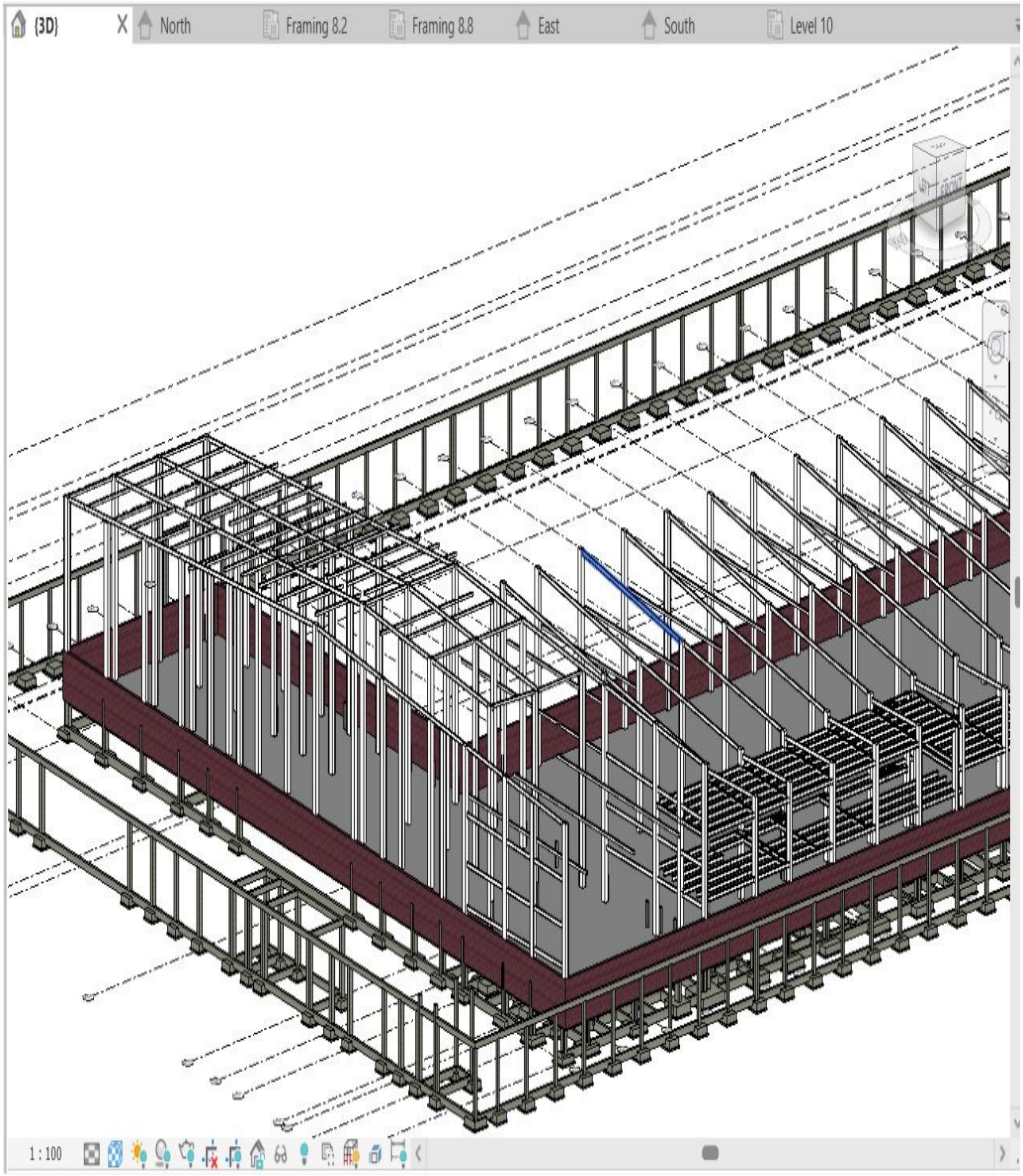
11.3 –BIM Uses

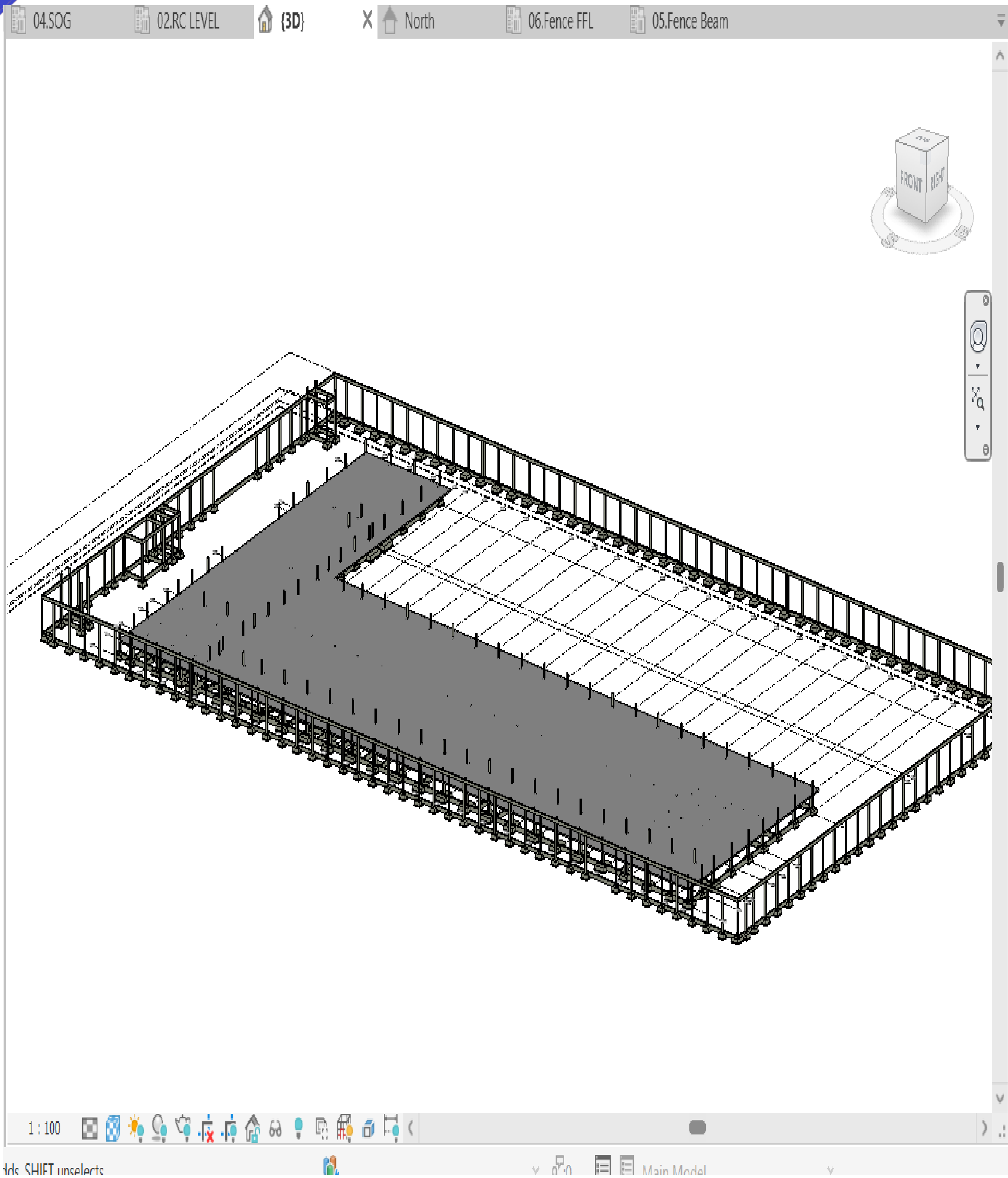
BIM uses refers to various processes, tasks, or applications where BIM technology is employed to enhance the planning, design, construction, and operation management of buildings and infrastructure. Each BIM use leverages the model-centric approach of BIM to facilitate specific aspects of a project, ranging from visualization and analysis to collaboration and lifecycle management.

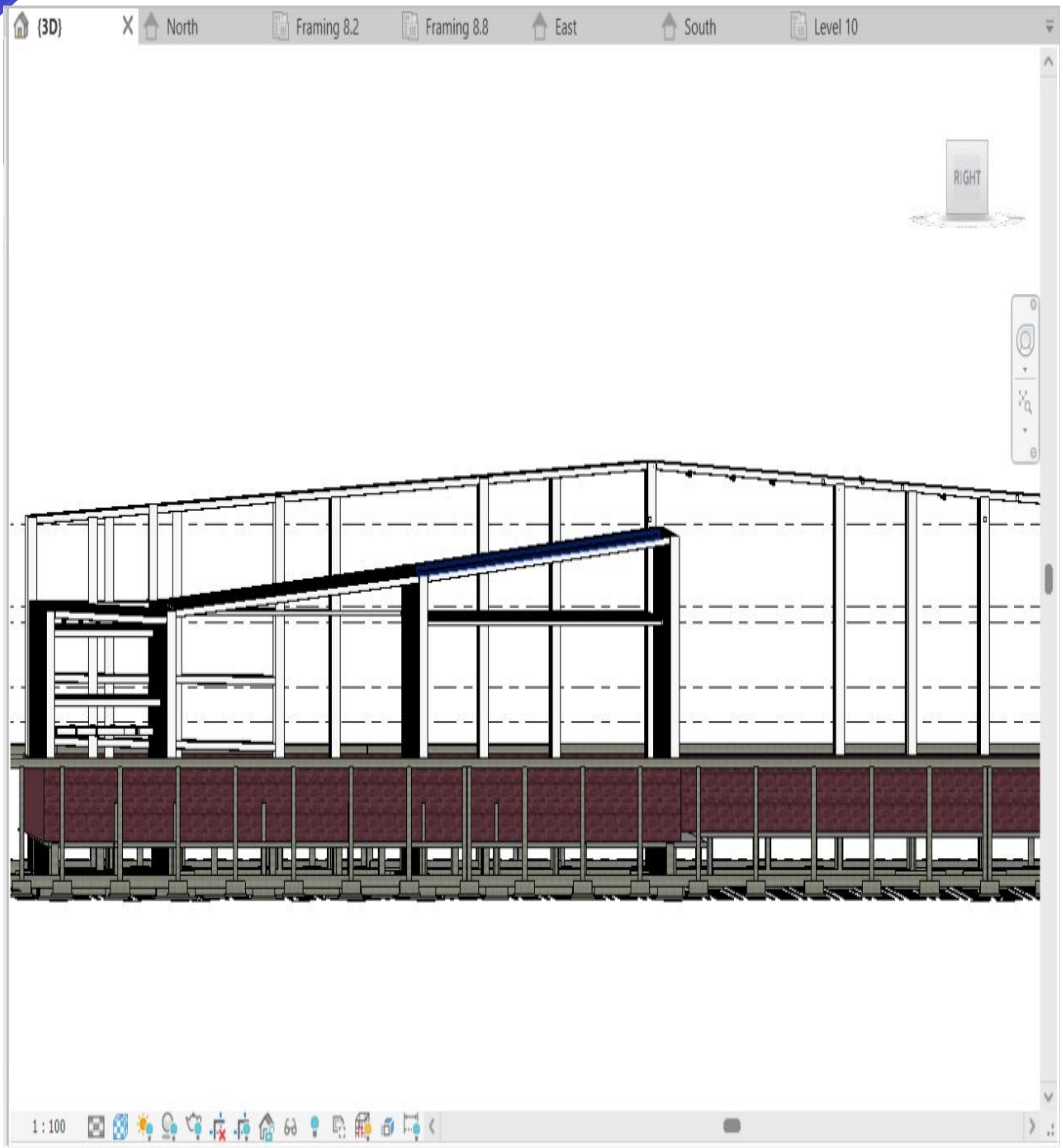


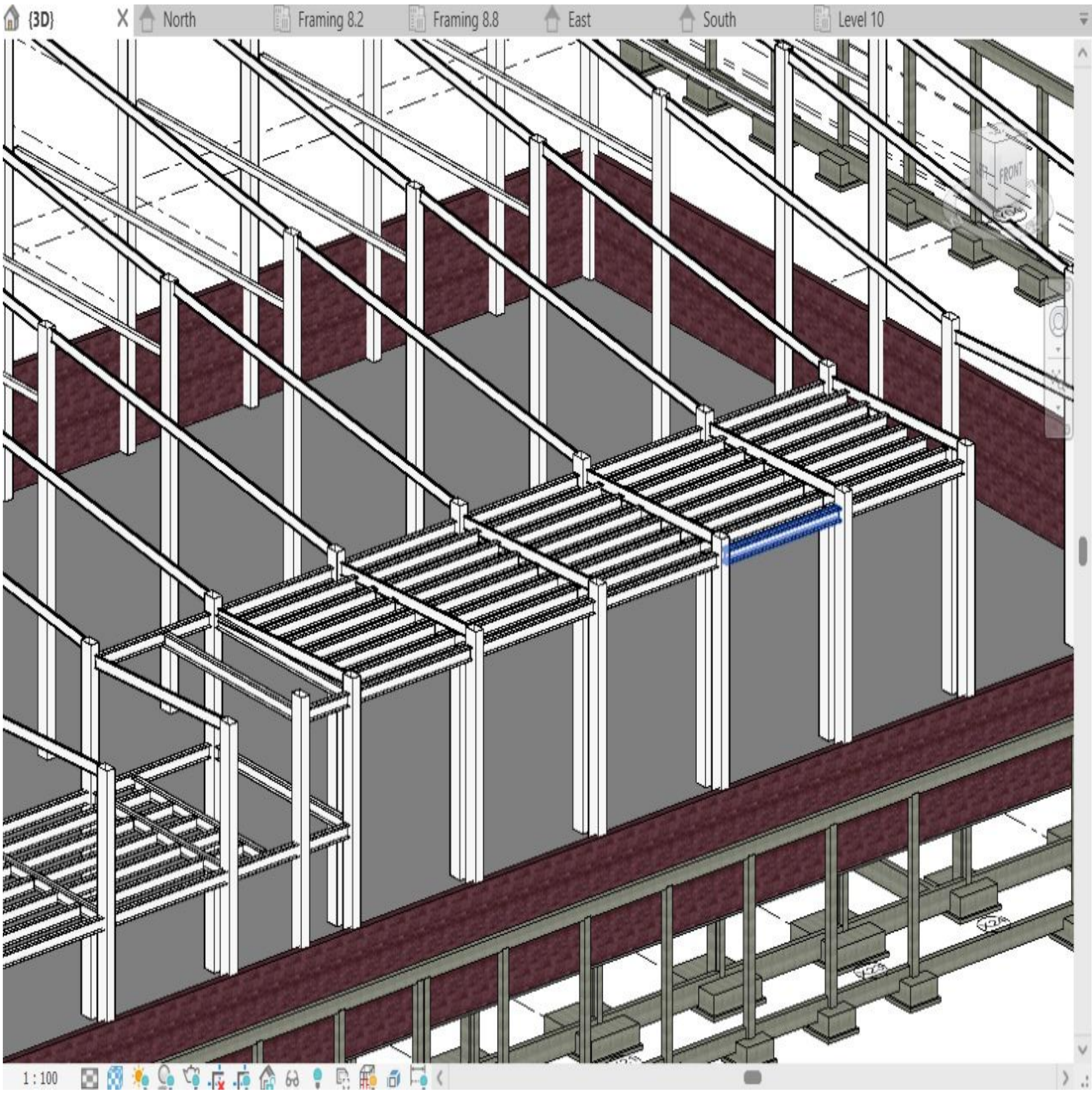
11.4 –3D MODEL


{3D}
North
Framing 8.2
Framing 8.8
East
South
Level 10
RIGHT
1 : 100


{3D}
North
Framing 8.2
Framing 8.8
East
South
Level 10
1 : 100

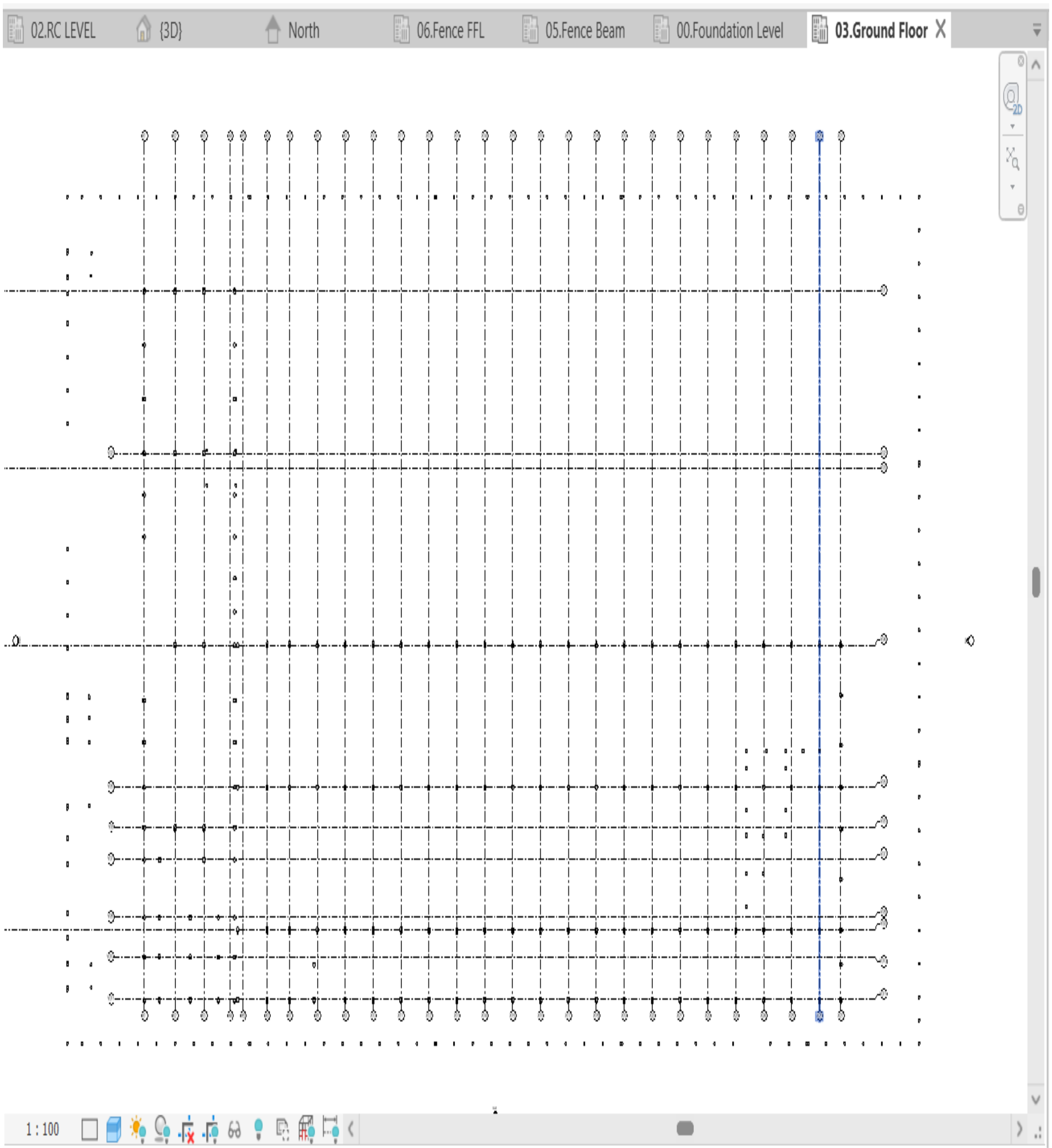

04.SOG
02.RC LEVEL
{3D}
North
06.Fence FFL
05.Fence Beam
FRONT
RIGHT
1 : 100
dds, SHIFT unselects
Main Model

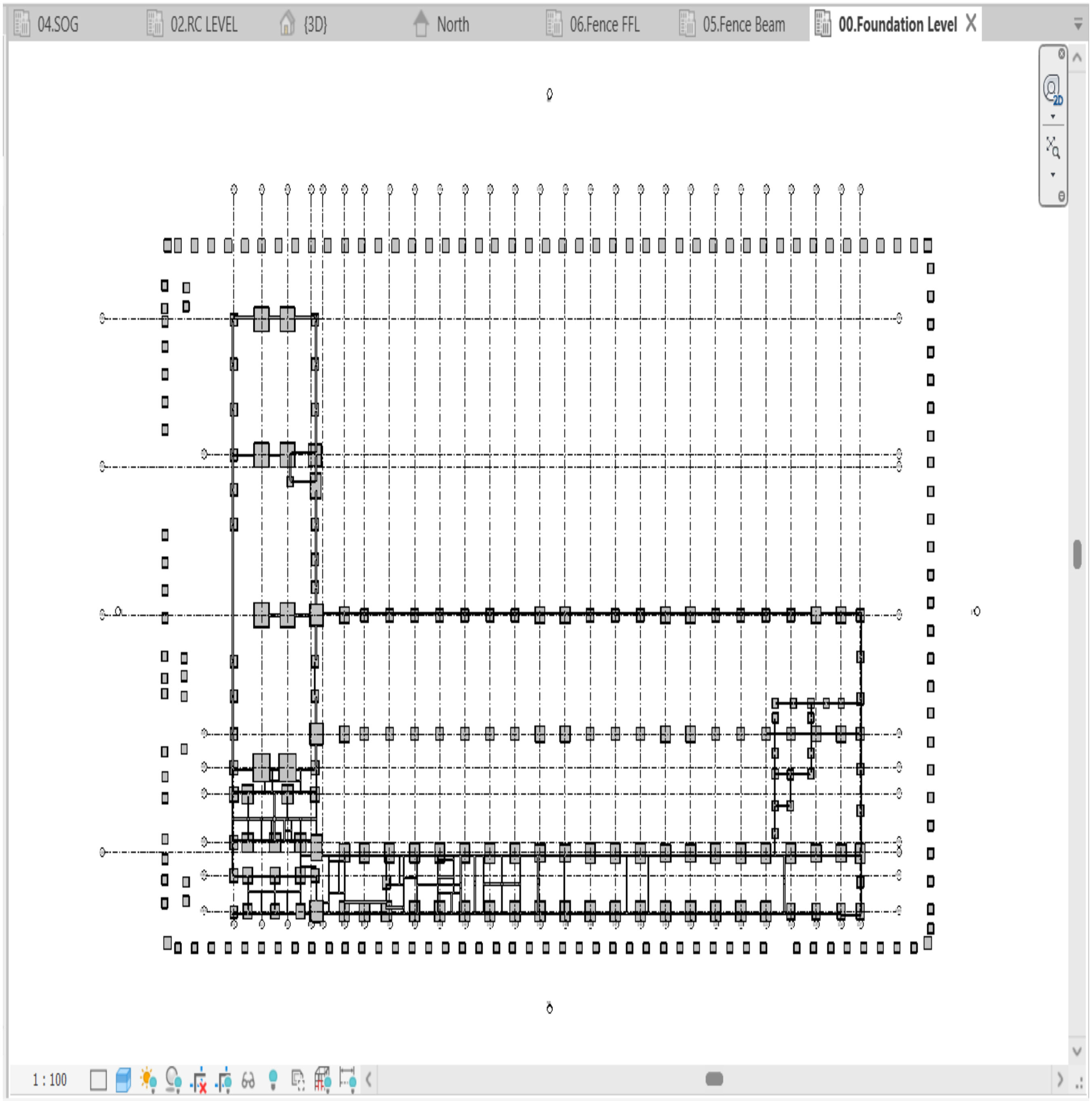

{3D}
North
Framing 8.2
Framing 8.8
East
South
Level 10
RIGHT
1 : 100

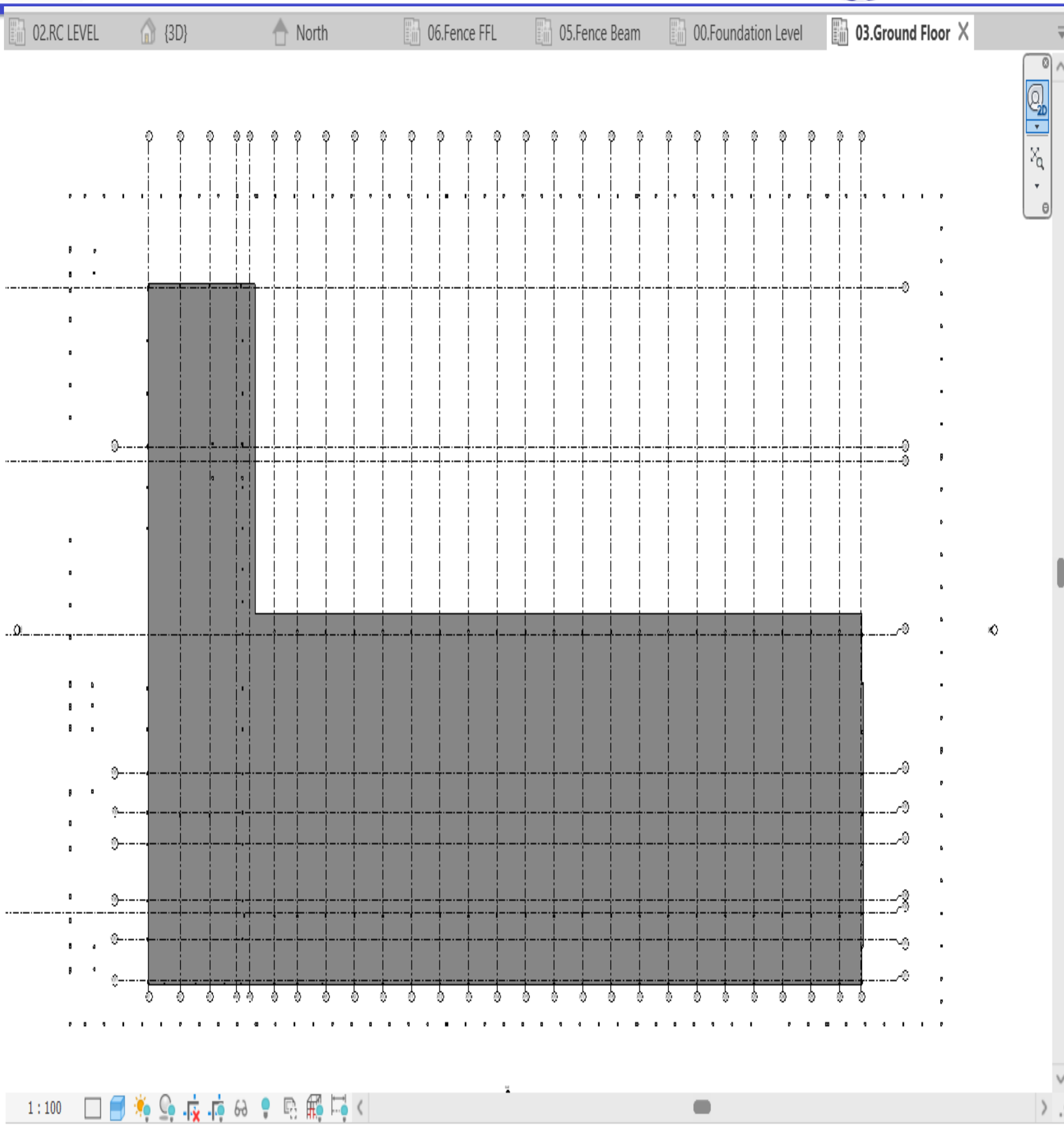

{3D}
North
Framing 8.2
Framing 8.8
East
South
Level 10
FRONT
1 : 100


(3D)
North
Framing 8.2
Framing 8.8
East
South
Level 10
LEFT
Y01
Y02
Y03
Y04
Y05
Y06
Y07
Y08
Y09
Y010
Y011
1 : 100

11.5 –Quantity Take-Off




04.SOG
02.RC LEVEL
{3D}
North
06.Fence FFL
05.Fence Beam
00.Foundation Level
1 : 100


02.RC LEVEL
{3D}
North
06.Fence FFL
05.Fence Beam
00.Foundation Level
03.Ground Floor
1 : 100

<Structural Column Schedule>

A	B	C	D
Type Mark	Type	Count	Volume
C1	C1 250x250	111	19.36 m³
C1 Fence	C1 300x300	135	53.46 m³
C2	C2 300x300	4	1.04 m³
C2 Fence	C2 400X400	4	2.82 m³
C3 Fence	C3 400X400	4	2.82 m³
C4 Fence	C4 300x300	9	4.41 m³
P1	P1 400x500	26	7.37 m³
P1 Fence	P1 400x400	13	9.15 m³
P2	P2 400x500	23	6.17 m³
P3	P3 400x500	8	2.27 m³
P4	P4 400x500	7	1.81 m³
P5	P5 400x600	7	2.33 m³
P6	P6 500x500	17	5.90 m³
P7	P7 400x500	14	3.87 m³
P8	P8 400x500	1	0.28 m³
P9	P9 400x500	2	0.56 m³
P10	P10 400x400	20	4.66 m³
P11	P11 400x400	3	0.72 m³
P12	P12 400x400	3	0.73 m³
P13	P13 400x400	5	1.14 m³
P14	P14 400x500	4	1.15 m³
P15	P15 400x400	15	3.52 m³
P16	P16 500x600	2	0.69 m³
P17	P17 500x600	6	2.34 m³
Grand total: 443			138.57 m³

<Structural Foundation Schedule>					
A	B	C	D	E	F
Type	Count	Length	Width	Foundation Thickne	Volume
F1	5	1500	1500	400	4.50 m³
F1 Fence	45	1750	1450	450	51.38 m³
F1*	16	1300	1300	400	10.82 m³
F2	18	1600	1600	400	18.43 m³
F2 Fence	98	1300	1300	500	82.81 m³
F3	30	1700	1700	400	34.68 m³
F3 Fence	4	1700	1700	500	5.78 m³
F4	1	1800	1800	400	1.30 m³
F5	5	1850	1850	400	6.85 m³
F6	6	2000	2000	400	9.00 m³
F7	3	2200	2200	400	5.81 m³
F8	7	2400	2400	400	16.13 m³
F9	14	2200	2200	500	33.88 m³
F10	5	2600	2600	500	16.90 m³
F11	15	2700	2200	500	44.55 m³
F12	4	2200	1800	500	7.92 m³
F13	18	2350	2800	500	59.22 m³
F14	6	3400	3400	600	41.62 m³
F15	2	3900	3900	650	19.77 m³
FC1	4	3000	3000	600	21.60 m³
FC2	2	3500	2500	600	10.50 m³
PC 100	1	88410	152095	100	88.38 m³
PC Fence 100	1	102591	184669	100	37.95 m³
PC PAD 300	1	20502	128889	300	3.97 m³
Grand total: 311					633.74 m³

<Floor Schedule>			
A	B	C	D
Type	Area	Default Thickness	Volume
SOG 200mm	7747 m²	200	1549.40 m³

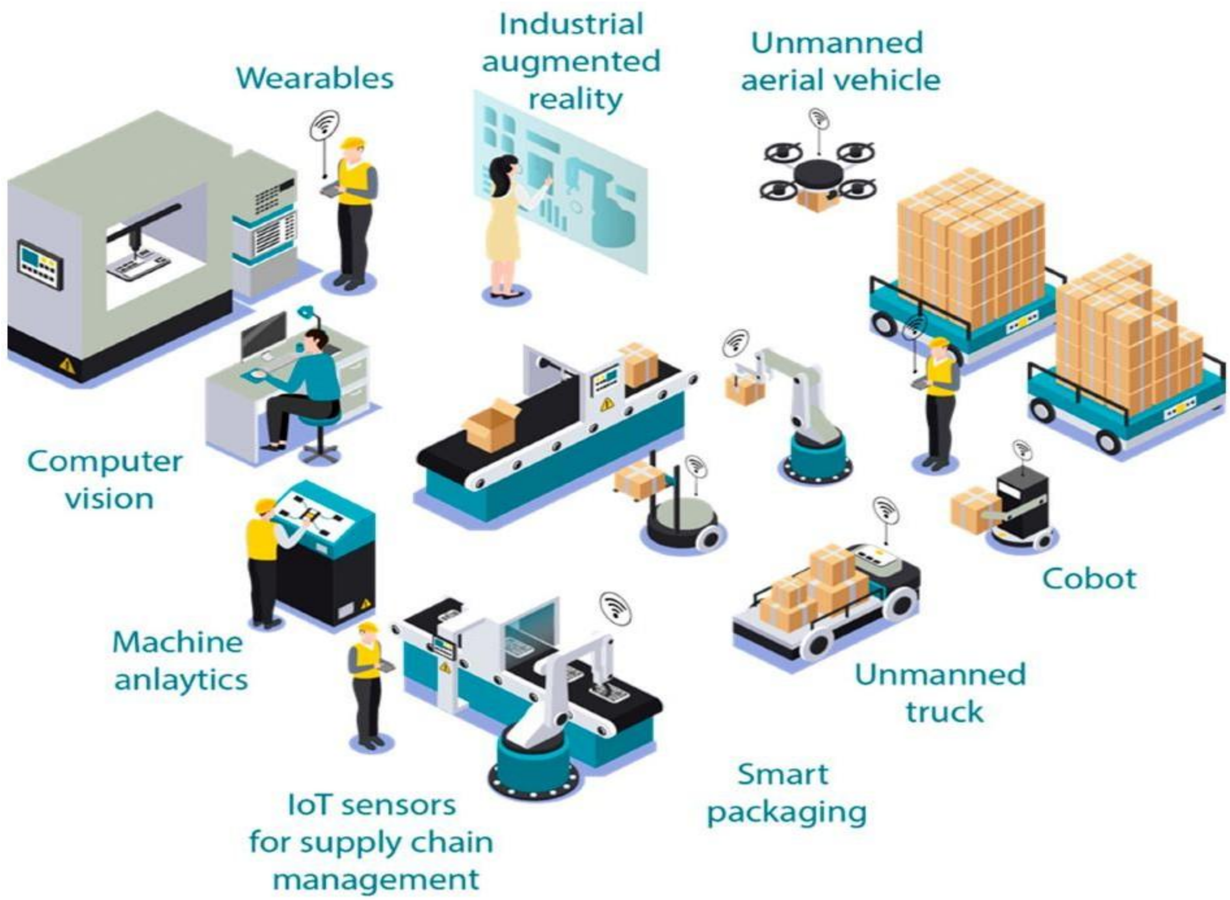
<Ground Beam Schedule>	
A	B
Type Mark	Volume
GB1	114.57 m³
GB2	19.81 m³
	134.38 m³

Chapter (12)

Smart Factory

Chapter 12: Smart Factory

12.1-Abstract



Technology and innovations have fueled the evolution of Industry 4.0, the fourth industrial revolution. Industry 4.0 encourages growth and development through its efficiency capacity, as documented in the literature.
The growth of the construction industry is a subset of the universal set of the gross domestic product value; thus, Industry 4.0 has a spillover effect on the engineering

and construction industry. In this study,
we aimed to map the state ofIndustry 4.0 in the construction industry, to identify its key areas, and evaluate and interpret the available evidence.

With building information modelling (BIM) as the core in the cyber-physical system, the cyber-planning-physical system is able to accommodate BIM functionalities to improve construction lifecycle.

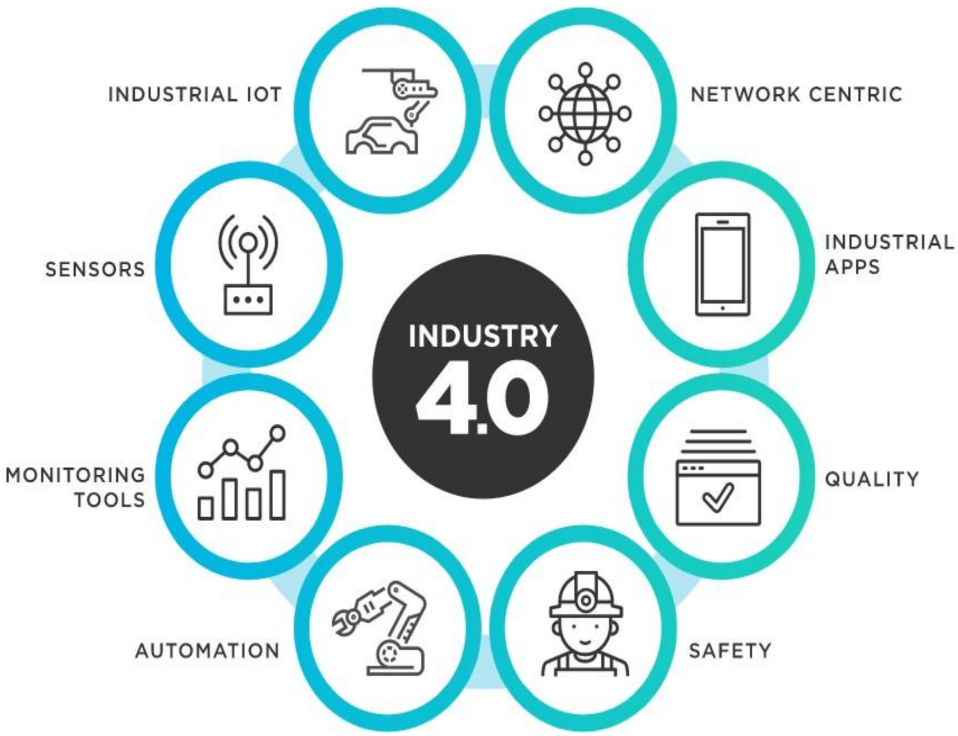
This collaboration and autonomous synchronization system are able to automate the design and construction processes, and improve the ability of handling substantialamounts of heterogeneity-laden data.
Industry 4.0 is expected to augment both the quality and productivity of construction and attract domestic and foreign investors.

12.2-Introduction

The Smart Factory is a concept for expressing the end goal of digitization in manufacturing. The way the term is most commonly used, a Smart Factory is a highly digitized shop floor that continuously collects and shares data through connected machines, devices, and production systems.
The data can then be used by self-optimizing devices or across the organization to proactively address issues, improve manufacturing processes and respond to new demands.

Smart factories can monitor the entire production process, by connecting the physical and digital world, from manufacturing tools and the supply chain to individual operators on the shop floor.
When fully realized, Smart factories use fully integrated, collaborative manufacturing systems to make operations flexible, adaptable, and optimizable.
Because of various technologies such as Big Data Analytics, Cloud Computing, and Industrial IoT (Internet of Things), Smart manufacturing practice fully comprehensive.
*Since there are a lot of problems with the traditional factories, the*need of the technology increased till Industry 4.0 is found

12.3-Technologies of Industry 4.0 in Smart Factory



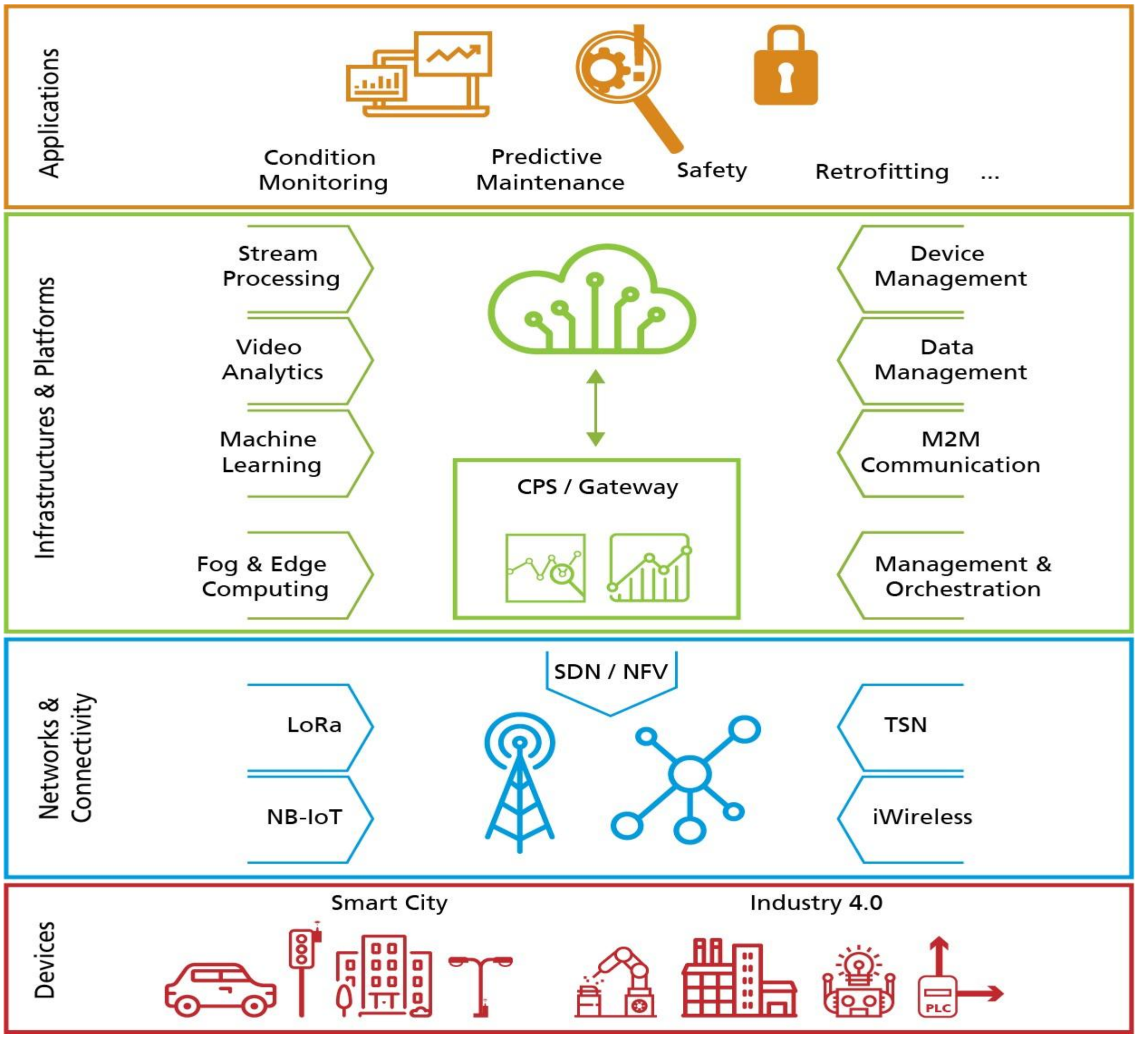
Industry 4.0 is a name for the current trend of automation and data exchange in manufacturing technologies. Industry 4.0 creates what has been called a "smart factory".

The manufacturing practice adopted by smart factories – smart manufacturing –is the most optimized application of technologies arising from the fourth industrial revolution known as Industry 4.0.

The smart factory is not about deploying one software across the entire shop floor and seeing immediate improvements in the production process. A combination of various Industry 4.0 technologies contributes to the optimizationof smart manufacturing.

Here are the most important enabling technologies:

12.4-Industrial IoT (IIoT)



Industrial IoT refers to interconnected devices, machines, and/or processes that are linked by data communication systems to facilitate the exchange and the use of data between people and machines. Typically, these instruments have sensors that collect meaningful data points on a cloud or off-line database for tracking and identifying ways to improve the manufacturing process.

Industrial IoT enablesoperational efficiency, control, and visibility into actionable key metrics.

12.5-Sensors

Sensors attached to devices and machines help collect distinct data points at specific stages of the manufacturing process, providing instant visibility into various layers of the shop floor.
For example, temperature sensors in acleanroom can track and detect the climate in a lab and share that data through an IoT gateway. The data can then be used to self-correct with AI (Artificial Intelligence) or alert relevant team members for review.

12.6-Cloud Computing

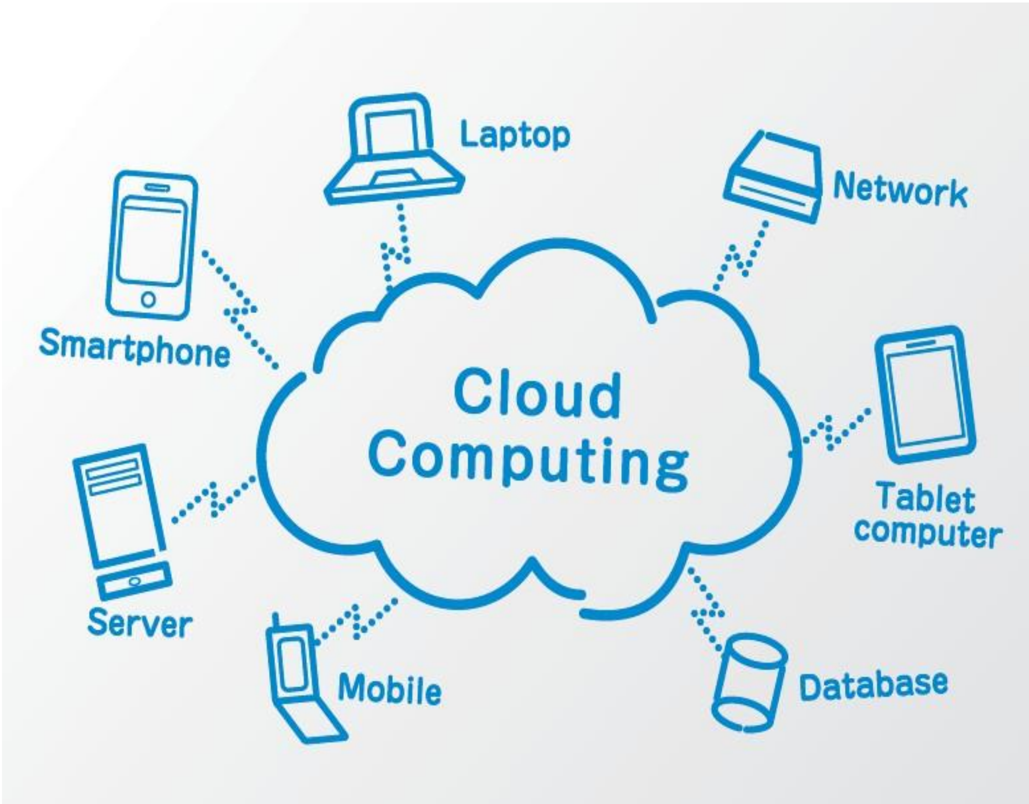


Figure 37 cloud computing

Cloud

Computing allows smart factories to store, process, and share data with greater flexibility at a lower cost than traditional on premise alternatives. Interconnecteddevices and machines on the shop floor benefit from being able to quickly uploadlarge amounts of data that can be distilled to provide feedback and make decisions near real-time.

12.7-Big Data Analytics

The accumulation of data over time can provide insights into how efficient the production process is, which key metrics to focus on, and what systems are underperforming. The sheer size of Big Data can spot error patterns and run predictive quality assurance with high accuracy.
The presentation and the timing of big data analytics — being delivered the right information at the right time — enables shop floors to improve optimally and quickly.

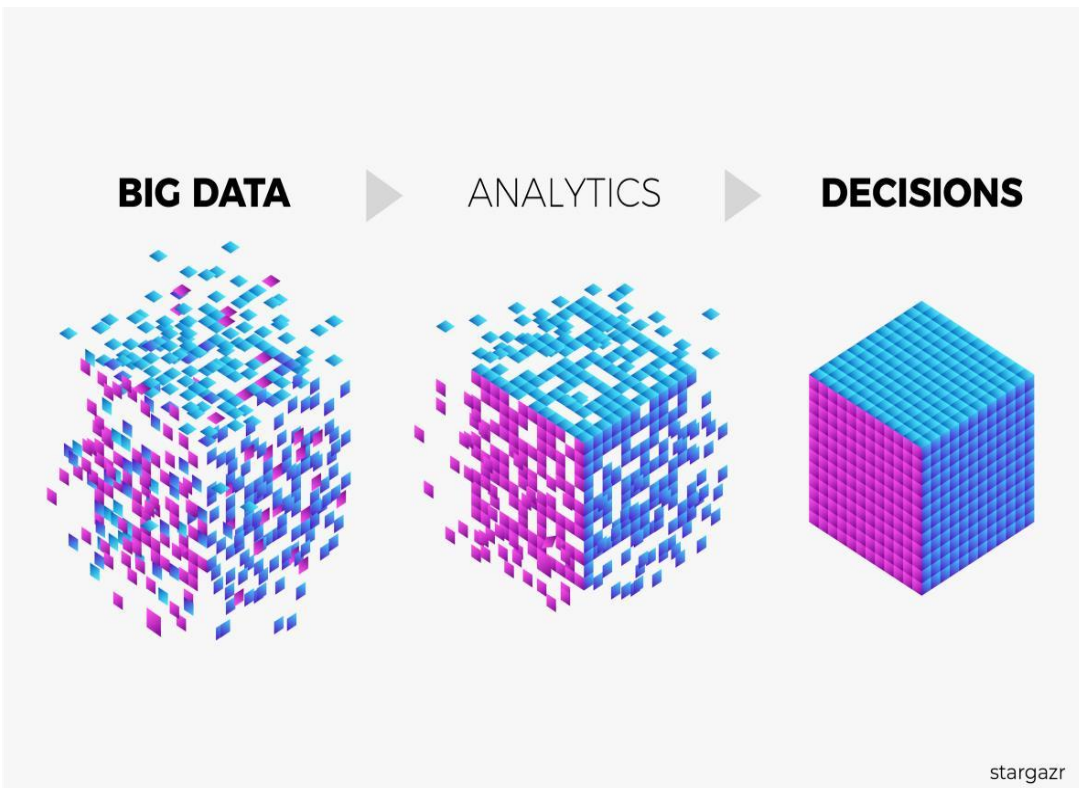


Figure 38 Big Data Info graph

12.8-Benefits of Smart Factory

Smart factories optimize efficiency and productivity by extending the capabilities of both manufacturing devices and people. By focusing on creating an agile, iterative production process through data collection, smart factories can aid decision-making processes with stronger evidence.

By continuously improving the productivity of manufacturing processes, smart factories can lower costs, reduce downtime and minimize waste. Identifying and reducing misplaced or underused production capacities mean opportunities for growth without investing in additional monetary and/or physical resources.

12.9-Smart Levels: Four Levels of Smart Factory

These four levels of data structure can help you evaluate where you are on the progress to becoming a smart factory and what steps you need to take to make advancements to the next level.

Level One: Available Data

This is likely the current status of most factories. Data is available, but not accessible. Sorting and analyzing data requires manual work and can be highly time-consuming, adding more inefficiencies to the production improvement process than intended or needed.

Level Two: Accessible Data

At this stage, data is presented in a more digestible form. Data is structurally organized and sorted properly in one location with additional systems that help visualize data and display dashboards. The factory is able to perform proactive analysis, although this may still require some time andeffort.

Level Three: Active Data

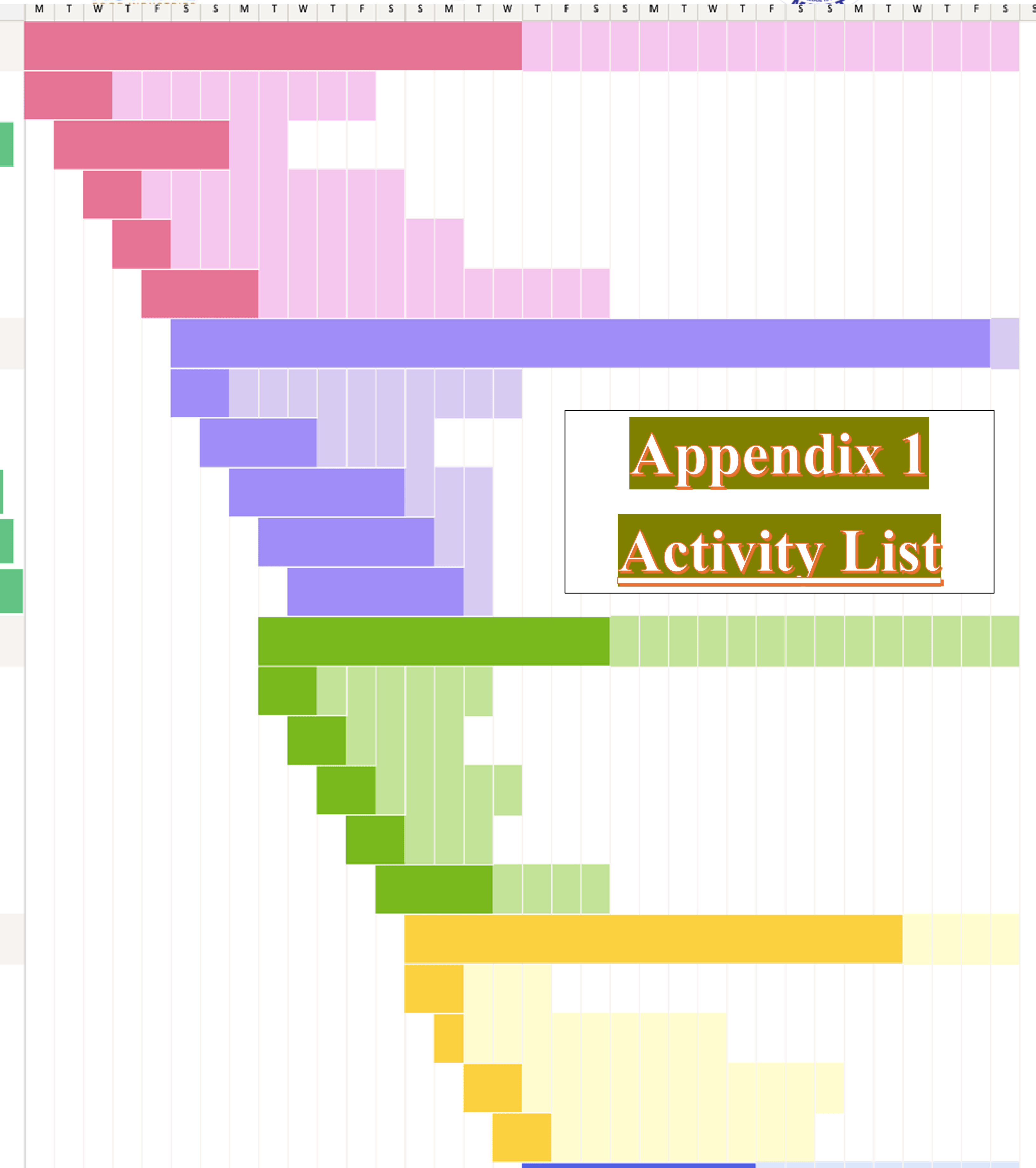
Active data means data that can perform proactive analysis using machine learning and artificial intelligence to generate insights without much human supervision. The system can pin key issues and anomalies to predict failures with high accuracy and inform relevant people with valuable insights at the right time.

Level Four: Action-oriented Data

At this stage, machine learning can generate actionable solutions to the issues that are identified in the earlier stages. The manufacturing machines and devices that are connected to this module or system can then execute those changes with no human intervention. Collecting data, identifying issues, and generating solutions happen in sequence with little to no human input.

Appendix 1

Activity List



Appendix 1

Activity List

WBS Name	Activity Name	Quantity	Unit	Crew Description	Productivity/day	No. of Crew	Duration(days)	final duration
Production Hall								
Earth Works								
	Excavation	3680	m3	1 excavator+2 trucks+ 1 syerveyor for all crews	300	1	12.27	13
	Backfilling	8100	m3	1 Loader+2 Truck+ 2 labour+ 1 compactor	450	1	18.00	18
Concrete Works								
Foundation								
Formwork								
	Shuttering PC Footing	88	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	2	2.00	2
	Deshuttering PC Footing	88	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	2	1.13	2
	Shuttering RC Footing	308	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	2	5.92	6
	Deshuttering RC Footing	308	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	2	3.95	4
Rft Work								
	Steel Fixing RC Footing	25	ton	steel fixer + helper	0.3	8	10.42	11
Concrete Pouring Work								
	Placing PC Footing	615	m2	2 Concrete Mason+5 Labors+1 Pump+1 Operator	3250	1	0.19	1
	Placing RC Footing	207	m3	2 Concrete Mason+5 Labors+1 Pump+1 Operator	100	1	2.07	3
Pedestals								
Formwork								
	Shuttering Pedestals	268	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	10.31	11
	Dehuttering Pedestals	268	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	6.87	7
Rft Work								
	Steel Fixing Pedestals	29	ton	steel fixer + helper	0.5	8	7.25	8
Concrete Pouring Work								
	First Placing Pedestals	18	m3	5 Labors+1 Pump+1 Operator+1 Vibrator	-	1	2.00	2
	Second Placing Pedestals	10	m3	5 Labors+1 Pump+1 Operator+1 Vibrator	-	1	2.00	2
RC Columns								
Formwork								
	Shuttering RC Columns	288	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	11.08	12
	Deshuttering RC Columns	288	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	7.38	8
Rft Work								
	Steel Fixing RC Columns	8.5	ton	steel fixer + helper	0.5	8	2.13	3
Concrete Pouring Work								
	Placing RC Columns	20	m3	5 Labors+1 Pump+1 Operator+1 Vibrator	80	1	2.00	2
Slab on Grade								
Formwork								
	Shuttering SOG	264	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	2	5.08	6
	Dehuttering SOG	264	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	2	3.38	4
Rft Work								
	Steel Fixing SOG	90	ton	steel fixer + helper	0.5	15	12.00	12
Concrete Pouring Work								
	Placing SOG	3330	m2	1 pump + 8 men (1 in charge 3 mason 4 unskilled)	1750	1	1.90	2
Foundation Insulation								
	Foundation Insulation	1650	m2	3 labor+3 helper	180	1	9.17	10
Steel Works								
Steel Structure Erection								
Steel Columns								
	Anchor Bolts and Plates	264	NR	2 Steel Fixer+2 Helper	60	1	4.40	5
	Installing Columns	66	NR	1 Crane+2 Manlift+2 Steel Fixer+2 Helper	15	1	4.40	5
Girders								
	Installing Girders	44	NR	1 Crane+2 Manlift+2 Steel Fixer+2 Helper	10	1	4.40	5

Purlins								
	Installing Side Purlins	84	NR	1 Crane+2 Manlift+2 Steel Fixer+2 Helper	16	1	5.25	6
	Installing Roof Purlins	210	NR	1 Crane+2 Manlift+2 Steel Fixer+2 Helper	18	1	11.67	12
Finishing Works								
Masonry Works								
	Masonry Works	1235	m2	1 charge hand civil+4 mason general+2 semi skilled labourers+2 unskilled labour	15	7	11.76	12
Sandwich Panels Works								
	Sandwich Panels Fixation	8000	m2	1 in charge + 4 fixers + 4 helpers	100	2	40.00	40
Aluminum & Metal Works								
	Facade Aliminum	-	m2	5 Skilled Labor	-	-	5.00	5
	Aliminum Doors	-	Nr	1 skilled + 2 helper	-	-	2.00	2
	Metal Doors	-	Nr	1 skilled + 2 helper	-	-	2.00	2
Painting & Plastering								
	Epoxy Flooring	3375	m2	1 Painter	45	10	7.50	8
	Internal Walls	1235	m2	2 Painters + 1 Helper	60	5	4.12	5
MEP Works								
Electrical Works								
Phase 1							45.00	45
	Electrical first fix	-	-	-	-	-	45.00	45
	Light current first fix	-	-	-	-	-	45.00	45
	Light current cables	-	-	-	-	-	37.00	37
	Electric cabling	-	-	-	-	-	35.00	35
Phase 2							25.00	25
	Wiring devices	-	-	-	-	-	25.00	25
	Lighting fixtures	-	-	-	-	-	22.00	22
	Light current fixtures & equipment	-	-	-	-	-	23.00	23
	MV Cable	-	-	-	-	-	10.00	10
	Fire Alarm System	-	-	-	-	-	22.00	22
HVAC Works								
Phase 1							40.00	40
	Ducts Works	-	-	-	-	-	40.00	40
	Piping Works	-	-	-	-	-	40.00	40
	Fans installation	-	-	-	-	-	40.00	40
	Diffusers & Grills	-	-	-	-	-	40.00	40
Phase 2							40.00	40
	AHUs	-	-	-	-	-	40.00	40
	Pumps	-	-	-	-	-	40.00	40
	Split units	-	-	-	-	-	4.00	4
Fire Fighting Works								
Phase 1							50.00	50
	Piping & Valves Works						45.00	45
	Sprinklers						45.00	45
Phase 2							15.00	15
	Fire Extinguishers						15.00	15
	Fire hose cabinets						10.00	10

Plumbing Works								
Phase 1							45.00	45
	Piping Works						45.00	45
	Air Compressors						15.00	15
Phase 2							20.00	20
	Chambers & Manholes						20.00	20
	Plumbing Fixtures						20.00	20
	Floor Drains & Cleanout						15.00	15
Labors Building								
Substructure								
Earth Works								
	Excavation	1104	m3	1 excavator+2 trucks+ 1 syerveyor for all crews	300	1	3.68	4
	Backfilling	2430	m3	1 Loader+2 Truck+ 2 labour+ 1 compactor	450	1	5.40	6
Concrete Works								
Foundation								
Formwork								
	Shuttering PC Footing	40	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	1.54	2
	Deshuttering PC Footing	40	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	1.03	2
	Shuttering RC Footing	172	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	2	3.31	4
	Deshuttering RC Footing	172	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	2	2.21	3
Rft Work								
	Steel Fixing RC Footing	13	ton	steel fixer + helper	0.3	10	4.33	5
Concrete Pouring Work								
	Placing PC Footing	310	m3	2 Concrete Mason+5 Labors+1 Pump+1 Operator	3250	1	0.10	1
	Placing RC Footing	104	m3	2 Concrete Mason+5 Labors+1 Pump+1 Operator	100	1	1.04	2
Pedestals								
Formwork								
	Shuttering Pedestals	130	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	2	2.50	3
	Dehuttering Pedestals	130	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	2	1.67	2
Rft Work								
	Steel Fixing Pedestals	15	ton	steel fixer + helper	0.5	10	3.00	3
Concrete Pouring Work								
	First Placing Pedestals	8	m3	5 Labors+1 Pump+1 Operator+1 Vibrator	-	1	2.00	2
	Second Placing Pedestals	6	m3	5 Labors+1 Pump+1 Operator+1 Vibrator	-	1	2.00	2
Foundation Insulation								
	Foundation Insulation	825	m2	3 labor+3 helper	180	1	4.58	5
Super Strucure								
Ground Floor								
Steel Works								
Steel Structure Erection								
Steel Columns								
	Anchor Bolts and Plates	72	NR	2 Steel Fixer+2 Helper	72	1	1.00	1
	Installing Columns	18		1 Crane+2 Manlift+2 Steel Fixer+2 Helper	18	1	1.00	1
Steel Beams								
	Installing Steel Beams	35		1 Crane+2 Manlift+2 Steel Fixer+2 Helper	15	1	2.33	3
Metal Decks								
	Installing Metal Decks	900	m2	1 Crane+2 Manlift+2 Steel Fixer+2 Helper	60	1	15.00	15
Concrete Works								
RC Columns								
Formwork								
	Shuttering RC Columns	60	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	2	1.15	2
	Dehuttering RC Columns	60	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	2	0.77	1
Rft Work								
	Steel Fixing RC Columns	2	ton	steel fixer + helper	0.5	10	0.40	1

Concrete Pouring Work									
	Placing SOG	592	m2	1 pump + 8 men (1 in charge 3 mason 4 unskilled)	1750	1	2.00	2
1st Floor									
Steel Works									
Steel Structure Erection									
Steel Columns									
	Installing Columns	18	Nr	1 Crane+2 Manlift+2 Steel Fixer+2 Helper	18	1	1.00	1
Steel Beams									
	Installing Steel Beams	35		1 Crane+2 Manlift+2 Steel Fixer+2 Helper	15	1	2.33	3
Metal Decks									
	Installing Metal Decks	600	m2	1 Crane+2 Manlift+2 Steel Fixer+2 Helper	60	1	10.00	10
Concrete Works									
RC Columns									
Formwork									
	Shuttering RC Columns	60	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	2	1.15	2
	Dehuttering RC Columns	60	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	2	0.77	1
Rft Work									
	Steel Fixing RC Columns	2	ton	steel fixer + helper	0.5	10	0.40	1
Concrete Pouring Work									
	Placing RC Columns	5	m3	5 Labors+1 Pump+1 Operator+1 Vibrator	80	1	0.06	1
Floor Slab on Grade									
Formwork									
	Shuttering SOG	46	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	2	0.88	1
	Dehuttering SOG	46	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	2	0.59	1
Rft Work									
	Steel Fixing SOG	15	t	steel fixer + helper	0.5	10	3.00	3
Concrete Pouring Work									
	Placing SOG	592	m2	1 pump + 8 men (1 in charge 3 mason 4 unskilled)	1750	1	2.00	2
Roof Slab On Grade									
Formwork									
	Shuttering SOG	46	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	2	0.88	1
	Dehuttering SOG	46	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	2	0.59	1
Rft Work									
	Steel Fixing SOG	10	t	steel fixer + helper	0.5	10	3.00	3
Concrete Pouring Work									
	Placing SOG	592	m2	1 pump + 8 men (1 in charge 3 mason 4 unskilled)	1750	1	2.00	2
Finishing Works									
Insulation									
	Roof Insulation	900	m2	3 labor+3 helper	180	1	5.00	5
Masonry Works									
	Masonry Works	843	m2	1 charge hand civil+4 mason general+2 semi skilled labourers+2 unskilled labour	15	5	11.24	12
Aluminum & Metal Works									
	Metal Lockers		Nr	-	-	1	1.00	1
	Aliminum Doors and Windows		Nr	-	-	1	1.00	1
	Metal Doors		Nr	-	-	1	1.00	1
Painting & Plastering									
	Internal Walls	843	m2	2 Painters + 1 Helper	45	6	3.12	4
	Internal Floor	1600	m2	2 Painters + 1 Helper	45	6	5.93	6

MEP Works								
Electrical Works								
Phase 1							45.00	45
	Electrical first fix						45.00	45
	Light current first fix						45.00	45
	Light current cables						37.00	37
	Electric cabling						35.00	35
	Generators						20.00	20
	Transformer						15.00	15
Phase 2							25.00	25
	Wiring devices						25.00	25
	Lighting fixtures						22.00	22
	Light current fixtures & equipment						23.00	23
	MV Cable						10.00	10
	Fire Alarm System						22.00	22
HVAC Works								
Phase 1							40.00	40
	Ducts Works						40.00	40
	Piping Works						40.00	40
	Fans installation						40.00	40
	Diffusers & Grills						40.00	40
	Chillers						40.00	40
Phase 2							40.00	40
	AHUs						40.00	40
	Pumps						40.00	40
	Split units						4.00	4
Fire Fighting Works								
Phase 1							50.00	50
	Piping & Valves Works						45.00	45
	Sprinklers						45.00	45
Phase 2							15.00	15
	Fire Extinguishers						15.00	15
	Fire hose cabinets						10.00	10
Plumbing Works								
Phase 1							45.00	45
	Piping Works						45.00	45
	Air Compressors						15.00	15
Phase 2							20.00	20
	Chambers & Manholes						20.00	20
	Plumbing Fixtures						20.00	20
	Floor Drains & Cleanout						15.00	15
Water Tank & Pump Room								
Earth Works								
	Excavation	1100	m3	1 excavator+2 trucks+ 1 syerveyor for all crews	300	1	3.67	4
Concrete Works								
Foundation								
Formwork								
	Shuttering PC Raft	10	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	0.38	1
	Deshuttering PC Raft	10	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	0.26	1
	Shuttering RC Raft	35	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	1.35	2
	Deshuttering RC Raft	35	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	0.90	1
Rft Work								
	Steel fixing RC Raft	7.5	ton	steel fixer + helper	0.5	5	3.00	3
Concrete Pouring Work								
	Placing PC Raft	160	m2	1 pump + 8 men (1 in charge 3 mason 4 unskilled)	3000	1	0.05	1
	Placing RC Raft	61	m3	1 pump + 8 men (1 in charge 3 mason 4 unskilled)	300	1	0.20	1

Water Stop								
	Water Stop Fixing	63	m	1 Fixer+ 1 Helper	150	1	0.42	1
Walls								
Formwork								
	Shuttering Walls	285	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	2	5.48	6
	Deshuttering Walls	285	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	2	3.65	4
Rft Work								
	Steel Fixing Walls	25	ton	steel fixer + helper	0.5	10	5.00	5
Concrete Pouring Work								
	Placing Walls	103	m3	1 pump + 8 men (1 in charge 3 mason 4 unskilled)	300	1	0.34	1
Roof Slab								
Formwork								
	Shuttering Roof Slab	155	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	2	2.98	3
	Deshuttering Roof Slab	155	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	2	1.99	2
Rft Work								
	Steel Fixing Roof Slab	7.5	ton	steel fixer + helper	0.4	5	3.75	4
Concrete Pouring Work								
	Placing Roof Slab	35	m3	1 pump + 8 men (1 in charge 3 mason 4 unskilled)	300	1	0.12	1
Finishing Works								
Metal Works								
	Metal Doors and Opennings		Nr	1 skilled + 2 helper	-	-	2.00	2
Insulation								
	Internal Insulation	370	m2	3 labor+3 helper	100	1	3.70	4
	Water Test	-	-		-	-	2.00	2
	External Insulation	370	m2	3 labor+3 helper	100	1	3.70	4
MEP Works								
Electrical Works								
Phase 1							35.00	35
	Electrical first fix						35.00	35
	Light current first fix						35.00	35
	Electric cabling						35.00	35
Phase 2							5.00	5
	Light current fixtures & equipment						5.00	5
HVAC Works								
Phase 1							5	5
	Fanes installation							
Phase 2								
	Louvers installation						5.00	5
Fire Fighting Works								
Phase 1								
	Fire Extinguishers						1.00	1
Phase 2								
	Fire System						8.00	8
Plumbing Works								
Phase 1								
	Piping Works						2.00	2
Phase 2								
	Roof Drain						2.00	2

Electric Room								
Earth Works								
	Excavation	50	m3	1 excavator+2 trucks+ 1 syerveyor for all crews	300	1	0.17	1
	Backfilling	75	m3	1 Loader+2 Truck+ 2 labour+ 1 compactor	450	1	0.17	1
Concrete Works								
Foundation								
Formwork								
	Shuttering PC Footing	4	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	0.15	1
	Deshuttering PC Footing	4	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	0.10	1
	Shuttering RC Footing	17	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	0.65	1
	Deshuttering RC Footing	17	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	0.44	1
Rft Work								
	Steel Fixing RC Footing	1.5	ton	steel fixer + helper	0.3	10	0.50	1
Concrete Pouring Work								
	Placing PC Footing	30	m2	2 Concrete Mason+5 Labors+1 Pump+1 Operator	3250	1	0.01	1
	Placing RC Footing	10	m3	2 Concrete Mason+5 Labors+1 Pump+1 Operator	100	1	0.10	1
RC Columns								
Formwork								
	Shuttering RC Columns	12	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	0.46	1
	Dehuttering RC Columns	12	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	0.31	1
Rft Work								
	Steel Fixing RC Columns	0.5	ton	steel fixer + helper	0.5	10	0.10	1
Concrete Pouring Work								
	Placing RC Columns	1	m3	5 Labors+1 Pump+1 Operator+1 Vibrator	80	1	0.01	1
Foundation Insulation								
	Foundation Insulation	77	m2	3 labor+3 helper	180	1	0.43	1
Roof Slab								
Formwork								
	Shuttering Roof Slab	34	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	1.31	2
	Deshuttering Roof Slab	34	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	0.87	1
Rft Work								
	Steel Fixing Roof Slab	1	ton	steel fixer + helper	0.4	3	0.83	1
Concrete Pouring Work								
	Placing Roof Slab	10	m3	1 pump + 8 men (1 in charge 3 mason 4 unskilled)	300	1	1.00	1
Slab on Grade								
Formwork								
	Shuttering SOG	13	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	0.50	1
	Dehuttering SOG	13	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	0.33	1
Rft Work								
	Steel Fixing SOG	0.8	t	steel fixer + helper	2.2	1	0.36	1
Concrete Pouring Work								
	Placing SOG	30	m2	1 pump + 8 men (1 in charge 3 mason 4 unskilled)	1750	1	0.02	1
Finishing Works								
Insulation								
	Roof Insulation	40	m2	3 labor+3 helper	180	1	0.22	1
Masonry Works								
	Masonry Works	83	m2	1 charge hand civil+4 mason general+2 semi skilled labourers+2 unskilled labour	15	3	1.84	2
Painting & Plastering								
	Internal Ceiling		m2	2 Painters + 1 Helper	40	1	1.00	1
	Walls		m2	2 Painters + 1 Helper	40	1	1.00	1
	Floor	40	m2	2 Painters + 1 Helper	40	1	1.00	1
	Facade		m2	2 Painters + 1 Helper	40	1	1.00	1

MEP Works								
Electrical Works								
	Electrical Works						15.00	15
HVAC Works								
	HVAC Works						7	7
Fire Fighting Works								
	Fire Fighting Works						3.00	3
Plumbing Works								
	Plumbing Works						3.00	3
Gas Room								
Earth Works								
	Excavation	20	m3	1 excavator+2 trucks+ 1 syerveyor for all crews	300	1	1.00	1
	Backfilling	35	m3	1 Loader+2 Truck+ 2 labour+ 1 compactor	450	1	0.08	1
Concrete Works								
Foundation								
Formwork								
	Shuttering PC Footing	4	m2	4 Carpenters + 4 Assistants + 1 Incharge	13	1	0.31	1
	Deshuttering PC Footing	4	m2	4 Carpenters + 4 Assistants + 1 Incharge	13	1	0.31	1
	Shuttering RC Footing	17	m2	4 Carpenters + 4 Assistants + 1 Incharge	13	1	1.31	2
	Deshuttering RC Footing	17	m2	4 Carpenters + 4 Assistants + 1 Incharge	13	1	1.31	2
Rft Work								
	Steel Fixing RC Footing	1.5	ton	steel fixer + helper	0.3	10	0.50	1
Concrete Pouring Work								
	Placing PC Footing	25	m2	2 Concrete Mason+5 Labors+1 Pump+1 Operator	3250	1	0.01	1
	Placing RC Footing	8	m3	2 Concrete Mason+5 Labors+1 Pump+1 Operator	100	1	0.08	1
RC Columns								
Formwork								
	Shuttering RC Columns	12	m2	4 Carpenters + 4 Assistants + 1 Incharge	13	1	0.92	1
	Dehuttering RC Columns	12	m2	4 Carpenters + 4 Assistants + 1 Incharge	13	1	0.92	1
Rft Work								
	Steel Fixing RC Columns	0.5	ton	steel fixer + helper	0.5	10	0.10	1
Concrete Pouring Work								
	Placing RC Columns	1	m3	5 Labors+1 Pump+1 Operator+1 Vibrator	80	1	0.01	1
Foundation Insulation								
	Foundation Insulation	77	m2	3 labor+3 helper	180m3			
Roof Slab								
Formwork								
	Shuttering Roof Slab		m2	4 Carpenters + 4 Assistants + 1 Incharge	13	1	0.00	
	Deshuttering Roof Slab		m2	4 Carpenters + 4 Assistants + 1 Incharge	13	1	0.00	
Rft Work							#DIV/0!	#DIV/0!
	Steel Fixing Roof Slab	1	ton	steel fixer + helper	0.4	10	0.25	1
Concrete Pouring Work							#DIV/0!	#DIV/0!
	Placing Roof Slab	5	m3	1 pump + 8 men (1 in charge 3 mason 4 unskilled)	300	1	0.02	1
Slab on Grade							#DIV/0!	#DIV/0!
Formwork							#DIV/0!	#DIV/0!
	Shuttering SOG	13	m2	4 Carpenters + 4 Assistants + 1 Incharge	13	1	1.00	1
	Dehuttering SOG	13	m2	4 Carpenters + 4 Assistants + 1 Incharge	13	1	1.00	1
Rft Work							#DIV/0!	#DIV/0!
	Steel Fixing SOG	0.4	ton	6 steel fixer + 4 Assistants + 1 Incharge	2.2		#DIV/0!	#DIV/0!
Concrete Pouring Work							#DIV/0!	#DIV/0!
	Placing SOG	15	m2	1 pump + 8 men (1 in charge 3 mason 4 unskilled)	1750	1	0.01	1
Finishing Works							#DIV/0!	#DIV/0!
Masonry Works							#DIV/0!	#DIV/0!
	Masonry Works	54	m2	1 charge hand civil+4 mason general+2 semi skilled labourers+2 unskilled labour	15	1	3.60	4

Insulation							#DIV/0!	#DIV/0!
	Roof Insulation		m2	3 labor+3 helper	180m3		#VALUE!	#VALUE!
Painting & Plastering							#DIV/0!	#DIV/0!
	Internal Ceiling		m2	2 Painters + 1 Helper	40		#DIV/0!	#DIV/0!
	Walls		m2	2 Painters + 1 Helper	40		#DIV/0!	#DIV/0!
	Floor		m2	2 Painters + 1 Helper	40		#DIV/0!	#DIV/0!
	Facade		m2	2 Painters + 1 Helper	40		#DIV/0!	#DIV/0!
MEP Works							#DIV/0!	#DIV/0!
MEP Works								
Electrical Works								
	Electrical Works						15.00	15
HVAC Works								
	HVAC Works						7	7
Fire Fighting Works								
	Fire Fighting Works						3.00	3
Plumbing Works								
	Plumbing Works						3.00	3
Goods Finish Area								
Earth Works								
	Excavation	1560	m3	1 excavator+2 trucks+ 1 syerveyor for all crews	300	1	5.20	6
	Backfilling	3440	m3	1 Loader+2 Truck+ 2 labour+ 1 compactor	450	1	7.64	8
Concrete Works								
Foundation								
Formwork								
	Shuttering PC Footing	28	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	1.08	2
	Deshuttering PC Footing	28	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	0.72	1
	Shuttering RC Footing	120	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	4.62	5
	Deshuttering RC Footing	120	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	3.08	4
Rft Work								
	Steel Fixing RC Footing	9	ton	steel fixer + helper	0.3	4	7.50	8
Concrete Pouring Work								
	Placing PC Footing	205	m2	2 Concrete Mason+5 Labors+1 Pump+1 Operator	3250	1	0.06	1
	Placing RC Footing	70	m3	2 Concrete Mason+5 Labors+1 Pump+1 Operator	100	1	0.70	1
Pedestals								
Formwork								
	Shuttering Pedestals	91	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	3.50	4
	Dehuttering Pedestals	91	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	2.33	3
Rft Work								
	Steel Fixing Pedestals	10	ton	steel fixer + helper	0.5	4	5.00	5
Concrete Pouring Work								
	First Placing Pedestals	5	m3	5 Labors+1 Pump+1 Operator+1 Vibrator	80	1	0.06	1
	Second Placing Pedestals	5	m3	5 Labors+1 Pump+1 Operator+1 Vibrator	80	1	0.06	1
Foundation Insulation								
	Foundation Insulation	550	m2	3 labor+3 helper	180m3	1	3.00	3
RC Columns								
Formwork								
	Shuttering RC Columns	72	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	2.77	3
	Dehuttering RC Columns	72	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	1.85	2
Rft Work								
	Steel Fixing RC Columns	3	ton	steel fixer + helper	0.3	4	2.50	3
Concrete Pouring Work								
	Placing RC Columns	6	m3	5 Labors+1 Pump+1 Operator+1 Vibrator	80	1	0.08	1

Slab on Grade								
Formwork								
	Shuttering SOG	70	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	2.69	3
	Dehuttering SOG	70	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	1.79	2
Rft Work								
	Steel Fixing SOG	26	ton	steel fixer + helper	0.5	4	13.00	13
Concrete Pouring Work								
	Placing SOG	692	m2	1 pump + 8 men (1 in charge 3 mason 4 unskilled)	1750	1	0.40	1
Steel Works								
Steel Structure Erection								
Steel Columns								
	Anchor Bolts and Plates	112	NR	2 Steel Fixer+2 Helper	20	1	6.00	6
	Installing Columns	28	NR	1 Crane+2 Manlift+2 Steel Fixer+2 Helper	10	1	3.00	3
Girders								
	Installing Girders	12		1 Crane+2 Manlift+2 Steel Fixer+2 Helper	3	1	4.00	4
Purlins								
	Installing Side Purlins	24		1 Crane+2 Manlift+2 Steel Fixer+2 Helper	6	1	4.00	4
	Installing Roof Purlins	18		1 Crane+2 Manlift+2 Steel Fixer+2 Helper	6	1	3.00	3
Finishing Works								
Masonry Works								
	Masonry Works	425	m2	1 charge hand civil+4 mason general+2 semi skilled labourers+2 unskilled labour	15	5	5.67	6
Sandwich Panels Works								
	Sandwich Panels Fixation	2250	m2	1 in charge + 4 fixers + 4 helpers	100	1	20.00	20
Aluminum & Metal Works								
	Facade Aliminum	-	m2	5 Skilled Labor	-	-	5.00	5
	Aliminum Doors	-	Nr	1 skilled + 2 helper	-	-	2.00	2
	Metal Doors	-	Nr	1 skilled + 2 helper	-	-	2.00	2
Painting & Plastering								
	Epoxy Flooring	1125	m2	1 Painter	45	10	2.50	3
	Internal Walls	425	m2	2 Painters + 1 Helper	40	5	2.13	3
MEP Works								
Electrical Works								
Phase 1								
	Electrical first fix						25.00	25
	Light current first fix						25.00	25
	Light current cables						25.00	25
	Electric cabling						25.00	25
Phase 2								
	Wiring devices						25.00	25
	Lighting fixtures						23.00	23
	Light current fixtures & equipment						23.00	23
	Fire Alarm System						23.00	23
HVAC Works								
Phase 1								
	Ducts Works						25.00	25
	Fanes Installation						25.00	25
Phase 2								
	Diffusers & Grills						25.00	25
Fire Fighting Works								
Phase 1								
	Fire Extinguishers						2.00	2
Phase 2								
	Piping & Valves Works						25.00	25
	Sprinkler						25.00	25

Plumbing Works								
Phase 1								
	Piping Works						10.00	10
Phase 2								
	Floor Drains & Cleanout						15.00	15
Admin Area								
Substructure								
Earth Works								
	Excavation	920	m3	1 excavator+2 trucks+ 1 syerveyor for all crews	300	1	3.07	4
	Backfilling	2000	m3	1 Loader+2 Truck+ 2 labour+ 1 compactor	450	1	4.44	5
Concrete Works								
Foundation								
Formwork								
	Shuttering PC Footing	24	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	0.92	1
	Deshuttering PC Footing	24	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	0.62	1
	Shuttering RC Footing	103	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	3.96	4
	Deshuttering RC Footing	103	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	2.64	3
Rft Work								
	Steel Fixing RC Footing	9	ton	steel fixer + helper	0.5	4	4.50	5
Concrete Pouring Work								
	Placing PC Footing	205	m2	2 Concrete Mason+5 Labors+1 Pump+1 Operator	3250	1	0.06	1
	Placing RC Footing	70	m3	2 Concrete Mason+5 Labors+1 Pump+1 Operator	100	1	0.70	1
Pedestals								
Formwork								
	Shuttering Pedestals	78	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	3.00	3
	Dehuttering Pedestals	78	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	2.00	2
Rft Work								
	Steel Fixing Pedestals	10	ton	steel fixer + helper	0.5	4	5.00	5
Concrete Pouring Work								
	First Placing Pedestals	5	m3	5 Labors+1 Pump+1 Operator+1 Vibrator	80	1	0.06	1
	Second Placing Pedestals	5	m3	5 Labors+1 Pump+1 Operator+1 Vibrator	80	1	0.06	1
Foundation Insulation								
	Foundation Insulation	550	m2	3 labor+3 helper	180m3	1	3.00	3
Super Strucure								
Ground Floor								
Steel Works								
Steel Structure Erection								
Steel Columns								
	Anchor Bolts and Plates	60	NR	2 Steel Fixer+2 Helper	60	1	1.00	1
	Installing Columns	15		1 Crane+2 Manlift+2 Steel Fixer+2 Helper	15	1	1.00	1
Steel Beams								
	Installing Steel Beams	15		1 Crane+2 Manlift+2 Steel Fixer+2 Helper	15	1	1.00	1
Metal Deck								
	Installing Metal Decks	400		1 Crane+2 Manlift+2 Steel Fixer+2 Helper	60	1	6.67	7
Concrete Works								
RC Columns								
Formwork								
	Shuttering RC Columns	80	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	3.08	4
	Dehuttering RC Columns	80	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	2.05	3
Rft Work								
	Steel Fixing RC Columns	1	ton	steel fixer + helper	0.5	2	1.00	1
Concrete Pouring Work								
	Placing RC Columns	2	m3	5 Labors+1 Pump+1 Operator+1 Vibrator	80	1	0.03	1

Slab on Grade								
Formwork								
	Shuttering SOG	39	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	1.50	2
	Dehuttering SOG	39	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	1.00	1
Rft Work								
	Steel Fixing SOG	8	ton	steel fixer + helper	2.2	2	1.82	2
Concrete Pouring Work								
	Placing SOG	296	m2	5 Labors+1 Pump+1 Operator+1 Vibrator	80	1	3.70	4
1st Floor								
Steel Works								
Steel Structure Erection								
Steel Columns								
	Installing Columns	15		1 Crane+2 Manlift+2 Steel Fixer+2 Helper	15	1	1.00	1
Steel Beams								
	Installing Steel Beams	15		1 Crane+2 Manlift+2 Steel Fixer+2 Helper	15	1	1.00	1
Metal Deck								
	Installing Metal Decks	400		1 Crane+2 Manlift+2 Steel Fixer+2 Helper	60	1	6.67	7
Concrete Works								
RC Columns								
Formwork								
	Shuttering RC Columns	80	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	3.08	4
	Dehuttering RC Columns	80	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	2.05	3
Rft Work								
	Steel Fixing RC Columns	1	ton	steel fixer + helper	0.5	2	1.00	1
Concrete Pouring Work								
	Placing RC Columns	2	m3	5 Labors+1 Pump+1 Operator+1 Vibrator	80	1	0.03	1
Slab on Grade								
Formwork								
	Shuttering SOG	39		4 Carpenters + 4 Assistants + 1 Incharge	26	1	1.50	2
	Dehuttering SOG	39		4 Carpenters + 4 Assistants + 1 Incharge	39	1	1.00	1
Rft Work								
	Steel Fixing SOG	8	ton	steel fixer + helper	2.2	2	1.82	2
Concrete Pouring Work								
	Placing SOG	296	m2	5 Labors+1 Pump+1 Operator+1 Vibrator	80	1	3.70	4
2nd Floor								
Steel Works								
Steel Structure Erection								
Col Steel Columns								
	Installing Columns	15		1 Crane+2 Manlift+2 Steel Fixer+2 Helper	15	1	1.00	1
Girders								
	Installing Girders	4		1 Crane+2 Manlift+2 Steel Fixer+2 Helper	3	1	1.33	2
Steel Beams								
	Installing Steel Beams	10		1 Crane+2 Manlift+2 Steel Fixer+2 Helper	15	1	0.67	1
Concrete Works								
RC Columns								
Formwork								
	Shuttering RC Columns	80	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	3.08	4
	Dehuttering RC Columns	80	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	2.05	3
Rft Work								
	Steel Fixing RC Columns	1	ton	steel fixer + helper	0.5	2	1.00	1
Concrete Pouring Work								
	Placing RC Columns	2	m3	5 Labors+1 Pump+1 Operator+1 Vibrator	80	1	0.03	1

Slab on Grade								
Formwork								
	Shuttering SOG	39	m2	4 Carpenters + 4 Assistants + 1 Incharge	13	1	3.00	3
	Dehuttering SOG	39	m2	4 Carpenters + 4 Assistants + 1 Incharge	13	1	3.00	3
Rft Work								
	Steel Fixing SOG	8	ton	steel fixer + helper	2.2	2	1.82	2
Concrete Pouring Work								
	Placing SOG	296	m2	5 Labors+1 Pump+1 Operator+1 Vibrator	80	1	3.70	4
Finishing Works								
Masonry Works								
	Masonry Works	905	m2	1 charge hand civil+4 mason general+2 semi skilled labourers+2 unskilled labour	15	5	12.07	13
Sandwich Panels Works								
	Sandwich Panels Fixation	700	m2	1 in charge + 4 fixers + 4 helpers	100	1	7.00	7
Aluminum & Metal Works								
	Facade Aliminum		m2				6.00	6
	Aliminum Doors		Nr				2.00	2
	Metal Doors		Nr				2.00	2
Painting & Plastering								
	Internal Walls	905	m2	2 Painters + 1 Helper	40	3	7.54	8
	Internal Floor	1200	m2	2 Painters + 1 Helper	40	3	10.00	10
MEP Works								
Electrical Works								
Phase 1								
	Electrical first fix						25.00	25
	Light current first fix						25.00	25
	Light current cables						25.00	25
	Electric cabling						25.00	25
Phase 2								
	Wiring devices						25.00	25
	Lighting fixtures						25.00	25
	Light current fixtures & equipment						25.00	25
	Fire Alarm System						25.00	25
HVAC Works								
Phase 1								
	Ducts Works						21.00	21
	Piping Works						21.00	21
	Split units						10.00	10
Phase 2								
	Fans installation						21.00	21
	Diffusers & Grills						21.00	21
Fire Fighting Works								
Phase 1								
	Piping & Valves Works						30.00	30
	Sprinklers						30.00	30
Phase 2								
	Fire Extinguishers						2.00	2
	Fire hose cabinets						10.00	10
Plumbing Works								
Phase 1								
	Piping Works						15.00	15
Phase 2								
	Plumbing Fixtures						10.00	10
	Floor Drains & Cleanout						10.00	10

Fences & Guard Rooms								
Fence								
Earth Works								
	Excavation	650	m3	1 excavator+2 trucks+ 1 syerveyor for all crews	300	1	2.17	3
	Backfilling	1420	m3	1 Loader+2 Truck+ 2 labour+ 1 compactor	450	1	3.16	4
Concrete Works								
Foundation								
Formwork								
	Shuttering PC Footing	55	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	2.12	3
	Deshuttering PC Footing	55	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	1.41	2
	Shuttering RC Footing	248	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	9.54	10
	Deshuttering RC Footing	248	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	6.36	7
Rft Work								
	Steel Fixing RC Footing	30	ton	steel fixer + helper	0.3	7	14.29	15
Concrete Pouring Work								
	Placing PC Footing	615	m2	2 Concrete Mason+5 Labors+1 Pump+1 Operator	500	1	1.23	2
	Placing RC Footing	207	m3	2 Concrete Mason+5 Labors+1 Pump+1 Operator	80	1	2.59	3
Foundation Insulation								
	Foundation Insulation	1650	m2	3 labor+3 helper	180m3	2	5.00	5
RC Columns								
Formwork								
	Shuttering RC Columns	550	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	3	7.05	8
	Dehuttering RC Columns	550	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	3	4.70	5
Rft Work								
	Steel Fixing RC Columns	15	ton	steel fixer + helper	0.5	3	10.00	10
Concrete Pouring Work								
	Placing RC Columns	48	m3	5 Labors+1 Pump+1 Operator+1 Vibrator	80	1	2.00	2
Finishing Works								
Masonry Works								
	Masonry Works	1300	m2	1 charge hand civil+4 mason general+2 semi skilled labourers+2 unskilled labour	15	3	30.00	30
Gates Erection								
	Metal Doors Fixation						4.00	4
Painting and Plastering								
	Painting and Plastering	1300	m2	2 Painters + 1 Helper	40	3	10.83	11
Guard Rooms								
Guard Room 1								
Earth Works								
	Excavation	20	m3	1 excavator+2 trucks+ 1 syerveyor for all crews	300	1	0.07	1
	Backfilling	40	m3	1 Loader+2 Truck+ 2 labour+ 1 compactor	450	1	0.09	1
Concrete Works								
Foundation								
Formwork								
	Shuttering PC Footing	8	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	0.31	1
	Deshuttering PC Footing	8	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	0.21	1
	Shuttering RC Footing	34	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	1.31	2
	Deshuttering RC Footing	34	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	0.87	1
Rft Work								
	Steel Fixing RC Footing	1.5	ton	steel fixer + helper	0.5	10	0.30	1
Concrete Pouring Work								
	Placing PC Footing	60	m2	2 Concrete Mason+5 Labors+1 Pump+1 Operator	3250	1	0.02	1
	Placing RC Footing	20	m3	2 Concrete Mason+5 Labors+1 Pump+1 Operator	100	1	0.20	1
Foundation Insulation								
	Foundation Insulation	77	m2	3 labor+3 helper	180	1	0.43	1

RC Columns								
Formwork								
	Shuttering RC Columns	12	m2	4 Carpenters + 4 Assistants + 1 Incharge	13	1	0.92	1
	Dehuttering RC Columns	12	m2	4 Carpenters + 4 Assistants + 1 Incharge	13	1	0.92	1
Rft Work								
	Steel Fixing RC Columns	1	ton	steel fixer + helper	0.5	2	1.00	1
Concrete Pouring Work								
	Placing RC Columns	1	m3	5 Labors+1 Pump+1 Operator+1 Vibrator	80	1	0.01	1
Roof Slab								
Formwork								
	Shuttering Roof Slab	19	m2	4 Carpenters + 4 Assistants + 1 Incharge	28	1	0.73	1
	Deshuttering Roof Slab	19	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	0.49	1
Rft Work								
	Steel Fixing Roof Slab	1	ton	steel fixer + helper	0.5	2	1.00	1
Concrete Pouring Work								
	Placing Roof Slab	5	m3	5 Labors+1 Pump+1 Operator+1 Vibrator	80	1	0.06	1
Slab on Grade								
Formwork								
	Shuttering SOG	5	m2	4 Carpenters + 4 Assistants + 1 Incharge	28	1	0.19	1
	Dehuttering SOG	5	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	0.13	1
Rft Work								
	Steel Fixing SOG	0.3	ton	6 steel fixer + 4 Assistants + 1 Incharge	2.2	1	0.14	1
Concrete Pouring Work								
	Placing SOG	11	m2	5 Labors+1 Pump+1 Operator+1 Vibrator	1750	1	1.00	1
Finishing Works								
Masonry Works								
	Masonry Works	54	m2	1 charge hand civil+4 mason general+2 semi skilled labourers+2 unskilled labour	15	1	3.60	4
Insulation								
	Roof Insulation	15	m2	3 labor+3 helper	180	1	0.08	1
Painting & Plastering								
	Internal Ceiling	15	m2	2 Painters + 1 Helper	40	1	0.38	1
	Walls	48	m2	2 Painters + 1 Helper	40	1	1.20	2
	Floor	15	m2	2 Painters + 1 Helper	40	1	0.38	1
	Facade	48	m2	2 Painters + 1 Helper	40	1	1.20	2
MEP Works								
Electrical Works								
	Electrical Works	-	-	-	-	-	15.00	15
HVAC Works								
	HVAC Works	-	-	-	-	-	7.00	7
Fire Fighting Works								
	Fire Fighting Works	-	-	-	-	-	3.00	3
Plumbing Works								
	Plumbing Works	-	-	-	-	-	3.00	3
Guard Room 2								
Earth Works								
	Excavation	20	m3	1 excavator+2 trucks+ 1 syerveyor for all crews	300	1	0.07	1
	Backfilling	40	m3	1 Loader+2 Truck+ 2 labour+ 1 compactor	450	1	0.09	1

Concrete Works								
Foundation								
Formwork								
	Shuttering PC Footing	8	m2	4 Carpenters + 4 Assistants + 1 Incharge	13	1	0.62	1
	Deshuttering PC Footing	8	m2	4 Carpenters + 4 Assistants + 1 Incharge	13	1	0.62	1
	Shuttering RC Footing	34	m2	4 Carpenters + 4 Assistants + 1 Incharge	13	1	2.62	3
	Deshuttering RC Footing	34	m2	4 Carpenters + 4 Assistants + 1 Incharge	13	1	2.62	3
Rft Work								
	Steel Fixing RC Footing	1.5	ton	steel fixer + helper	0.3	10	0.50	1
Concrete Pouring Work								
	Placing PC Footing	60	m2	2 Concrete Mason+5 Labors+1 Pump+1 Operator	3250	1	0.02	1
	Placing RC Footing	20	m3	2 Concrete Mason+5 Labors+1 Pump+1 Operator	100	1	0.20	1
Foundation Insulation								
	Foundation Insulation	77	m2	3 labor+3 helper	180	1	0.43	1
RC Columns								
Formwork								
	Shuttering RC Columns	12	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	0.46	1
	Dehuttering RC Columns	12	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	0.31	1
Rft Work								
	Steel Fixing RC Columns	1	ton	steel fixer + helper	0.5	10	0.20	1
Concrete Pouring Work								
	Placing RC Columns	1	m3	5 Labors+1 Pump+1 Operator+1 Vibrator	80	1	0.01	1
Roof Slab								
Formwork								
	Shuttering Roof Slab		m2	4 Carpenters + 4 Assistants + 1 Incharge	13	1	0.00	
	Deshuttering Roof Slab		m2	4 Carpenters + 4 Assistants + 1 Incharge	13	1	0.00	
Rft Work								
	Steel Fixing Roof Slab	1	ton	steel fixer + helper	0.5	10	0.20	1
Concrete Pouring Work								
	Placing Roof Slab	5	m3	5 Labors+1 Pump+1 Operator+1 Vibrator	80	1	0.06	1
Slab on Grade								
Formwork								
	Shuttering SOG	5	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	1	0.19	1
	Dehuttering SOG	5	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	1	0.13	1
Rft Work								
	Steel Fixing SOG	0.3	ton	steel fixer + helper	0.5	1	0.60	1
Concrete Pouring Work								
	Placing SOG	11	m2	5 Labors+1 Pump+1 Operator+1 Vibrator	1750	1	0.01	1
Finishing Works								
Masonry Works								
	Masonry Works	54	m2	1 charge hand civil+4 mason general+2 semi skilled labourers+2 unskilled labour	15	1	3.60	4
Insulation								
	Roof Insulation	15	m2	3 labor+3 helper	180	1	0.08	1
Painting & Plastering								
	Internal Ceiling	15	m2	2 Painters + 1 Helper	40	1	0.38	1
	Walls	48	m2	2 Painters + 1 Helper	40	1	1.20	2
	Floor	15	m2	2 Painters + 1 Helper	40	1	0.38	1
	Facade	48	m2	2 Painters + 1 Helper	40	1	1.20	2
MEP Works								
Electrical Works								
	Electrical Works	-	-	-	-	-	15.00	15
HVAC Works								
	HVAC Works	-	-	-	-	-	7.00	7

Fire Fighting Works								
	Fire Fighting Works	-	-	-	-	-	3.00	3
Plumbing Works								
	Plumbing Works	-	-	-	-	-	3.00	3
Road Works								
Earth Works								
	Excavation	350	m3	1 Loader+1 Truck+2 operators	200	1	1.75	2
	Backfilling	200	m3	1 Loader+2 Truck+ 2 labour+ 1 compactor	50	1	4.00	4
Slab on Grade								
Formwork								
	Shuttering SOG	200	m2	4 Carpenters + 4 Assistants + 1 Incharge	26	2	3.85	4
	Deshuttering SOG	200	m2	4 Carpenters + 4 Assistants + 1 Incharge	39	2	2.56	3
Rft Work								
	Steel Fixing SOG	14	ton	6 steel fixers + 4 Assistants + 1 Incharge	2.2	1	6.36	7
Concrete Pouring Work								
	Placing SOG	520	m2				3.00	3
Finishing Works								
	Concrete Curbs		Nr				30.00	30
	Interlock Works	3100	m2				30.00	30
	Wheel stoppers & Ballard Barriers		Nr				30.00	30
	Planting Works		-				30.00	30
	Marking & Signs		-				30.00	30
	Exterior Lighting Fixtures		-				30.00	30
	Bench Seats		Nr				30.00	30

Appendix 2

Primavera

Appendix 2

Primavera

Koning Food Factory Original		328	01-Apr-24	17-Apr-25
key dates		328	01-Apr-24	17-Apr-25
K7620	Project Start	0	01-Apr-24	
K7621	Project End	0		17-Apr-25
Mobilization		25	07-Apr-24	05-May-24
K7615	Installing Caravans	5	07-Apr-24	11-Apr-24
K7616	Utilities	5	13-Apr-24	17-Apr-24
K7617	Site Investigation	5	18-Apr-24	23-Apr-24
K7618	Site preparation	5	24-Apr-24	29-Apr-24
K7619	Site Survey	5	30-Apr-24	05-May-24
Indirect Cost and Profit		328	01-Apr-24	17-Apr-25
K7698	Indirect Costs = 20% of Di	328	01-Apr-24	17-Apr-25
K7699	Overheads, Taxes and Pro	328	01-Apr-24	17-Apr-25
Engineering		290	01-Apr-24	04-Mar-25
IFC		5	01-Apr-24	06-Apr-24
K7695	Structure Drawings	5	01-Apr-24	06-Apr-24
K7696	Architecture Drawings	5	01-Apr-24	06-Apr-24
K7697	MEP Drawings	5	01-Apr-24	06-Apr-24
Shopdrawing		30	07-Apr-24	11-May-24
Structure Drawing		30	07-Apr-24	11-May-24
K7592	Submittal	20	07-Apr-24	29-Apr-24
K7591	Approval	20	18-Apr-24	11-May-24
Architecture Drawing		30	07-Apr-24	11-May-24
K7685	Submittal	20	07-Apr-24	29-Apr-24
K7686	Approval	20	18-Apr-24	11-May-24
MEP drawing		30	07-Apr-24	11-May-24
K7687	Submittal	20	07-Apr-24	29-Apr-24
K7688	Approval	20	18-Apr-24	11-May-24
As Built Drawing		48	08-Jan-25	04-Mar-25
Structure Drawing		30	08-Jan-25	11-Feb-25
K7689	Submittal	20	08-Jan-25	30-Jan-25
K7690	Approval	20	20-Jan-25	11-Feb-25
Architecture Drawing		30	29-Jan-25	04-Mar-25
K7691	Submittal	20	29-Jan-25	20-Feb-25
K7692	Approval	20	10-Feb-25	04-Mar-25
MEP drawing		30	29-Jan-25	04-Mar-25
K7693	Submittal	20	29-Jan-25	20-Feb-25
K7694	Approval	20	10-Feb-25	04-Mar-25
Procurement		30	18-Apr-24	22-May-24
Contracting		20	18-Apr-24	11-May-24
Civil works		20	18-Apr-24	11-May-24
K7603	Civil Subcontractors Contr	20	18-Apr-24	11-May-24
Architecture Works		20	18-Apr-24	11-May-24
K7605	Architecture Subcontracto	20	18-Apr-24	11-May-24

Architecture Works		20	18-Apr-24	11-May-24
K7605	Architecture Subcontracto	20	18-Apr-24	11-May-24
MEP works		20	18-Apr-24	11-May-24
K7607	MEP Subcontractors Cont	20	18-Apr-24	11-May-24
Purchasing		30	18-Apr-24	22-May-24
Civil works		30	18-Apr-24	22-May-24
K7610	Purchasing order	20	18-Apr-24	11-May-24
K7609	Delivery to site	20	30-Apr-24	22-May-24
Architecture Works		30	18-Apr-24	22-May-24
K7612	Purchasing order	20	18-Apr-24	11-May-24
K7611	Delivery to site	20	30-Apr-24	22-May-24
MEP works		30	18-Apr-24	22-May-24
K7614	Purchasing order	20	18-Apr-24	11-May-24
K7613	Delivery to site	20	30-Apr-24	22-May-24
Construction		293	12-May-24	17-Apr-25
Production Hall		230	12-May-24	03-Feb-25
Civil Works		132	12-May-24	12-Oct-24
Earth Works		53	12-May-24	11-Jul-24
K1020	Excavation	20	12-May-24	03-Jun-24
K1040	Backfilling	7	04-Jul-24	11-Jul-24
Concrete Works		124	21-May-24	12-Oct-24
Foundation		17	21-May-24	09-Jun-24
Formwork		17	21-May-24	09-Jun-24
K1060	Shuttering PC Footing	2	21-May-24	22-May-24
K1070	Deshuttering PC Footing	1	25-May-24	25-May-24
K1080	Shuttering RC Footing	4	26-May-24	29-May-24
K1090	Deshuttering RC Footing	3	06-Jun-24	09-Jun-24
Rft Work		7	28-May-24	04-Jun-24
K1100	Steel Fixing RC Footing	7	28-May-24	04-Jun-24
Concrete Pouring Work		12	23-May-24	05-Jun-24
K1110	Placing PC Footing	1	23-May-24	23-May-24
K1120	Placing RC Footing	2	04-Jun-24	05-Jun-24
Pedestals		19	09-Jun-24	30-Jun-24
Formwork		17	11-Jun-24	30-Jun-24
K1130	Shuttering Pedestals	7	11-Jun-24	18-Jun-24
K1140	Dehuttering Pedestals	5	25-Jun-24	30-Jun-24
Rft Work		5	09-Jun-24	13-Jun-24
K1150	Steel Fixing Pedestals	5	09-Jun-24	13-Jun-24
Concrete Pouring Work		7	18-Jun-24	25-Jun-24
K1160	First Placing Pedestals	2	18-Jun-24	19-Jun-24
K1170	Second Placing Pedestals	2	24-Jun-24	25-Jun-24
RC Columns		17	23-Sep-24	12-Oct-24
Formwork		15	25-Sep-24	12-Oct-24
K1180	Shuttering RC Columns	8	25-Sep-24	03-Oct-24
K1190	Deshuttering RC Columns	5	07-Oct-24	12-Oct-24

Rft Work		2	23-Sep-24	24-Sep-24
K1200	Steel Fixing RC Columns	2	23-Sep-24	24-Sep-24
Concrete Pouring Work		2	05-Oct-24	06-Oct-24
K1210	Placing RC Columns	2	05-Oct-24	06-Oct-24
Slab on Grade		16	23-Sep-24	10-Oct-24
Formwork		16	23-Sep-24	10-Oct-24
K1220	Shuttering SOG	4	23-Sep-24	26-Sep-24
K1230	Dehuttering SOG	3	08-Oct-24	10-Oct-24
Rft Work		8	28-Sep-24	06-Oct-24
K1240	Steel Fixing SOG	8	28-Sep-24	06-Oct-24
Concrete Pouring Work		2	06-Oct-24	07-Oct-24
K1250	Placing SOG	2	06-Oct-24	07-Oct-24
Foundation Insulation		7	29-Jun-24	06-Jul-24
K1260	Foundation Insulation	7	29-Jun-24	06-Jul-24
Steel Works		52	19-Jun-24	18-Aug-24
Steel Structure Erection		52	19-Jun-24	18-Aug-24
Steel Columns		23	19-Jun-24	15-Jul-24
K1270	Anchor Bolts and Plates	5	19-Jun-24	24-Jun-24
K1280	Installing Columns	3	13-Jul-24	15-Jul-24
Girders		3	23-Jul-24	25-Jul-24
K1290	Installing Main Beams	3	23-Jul-24	25-Jul-24
Purlins		29	16-Jul-24	18-Aug-24
K1300	Installing Side Beams	6	16-Jul-24	22-Jul-24
K1310	Installing Roof Beams	20	27-Jul-24	18-Aug-24
Architecture Works		155	07-Aug-24	03-Feb-25
Masonry Works		25	13-Oct-24	10-Nov-24
K1320	Masonry Works	25	13-Oct-24	10-Nov-24
Sandwich Panels Works		40	07-Aug-24	22-Sep-24
K1330	Sandwich Panels Fixation	40	07-Aug-24	22-Sep-24
Openings and Facade works		71	13-Nov-24	03-Feb-25
K1350	Aliminum Doors	2	13-Nov-24	14-Nov-24
K1360	Metal Doors	2	13-Nov-24	14-Nov-24
K1340	Facade Aliminum	5	29-Jan-25	03-Feb-25
Finishes		71	07-Nov-24	28-Jan-25
K1380	Plastering	5	07-Nov-24	12-Nov-24
K7622	Painting	5	14-Jan-25	19-Jan-25
K1370	Epoxy Flooring	8	20-Jan-25	28-Jan-25
MEP Works		65	11-Nov-24	25-Jan-25
Electrical Works		39	17-Nov-24	31-Dec-24
1st fix		30	17-Nov-24	21-Dec-24
K7631	Electrical first fix	20	17-Nov-24	09-Dec-24
K7632	Light current cables	20	25-Nov-24	17-Dec-24
K7633	Electric cabling	20	28-Nov-24	21-Dec-24

2nd fix		23	05-Dec-24	31-Dec-24
K7634	Generators	10	05-Dec-24	16-Dec-24
K7635	Transformer	10	05-Dec-24	16-Dec-24
K7640	Fire Alarm System	15	11-Dec-24	28-Dec-24
K7639	MV Cable	15	15-Dec-24	31-Dec-24
3rd fix		17	09-Dec-24	28-Dec-24
K7636	Wiring devices	15	09-Dec-24	25-Dec-24
K7637	Lighting fixtures	15	11-Dec-24	28-Dec-24
K7638	Light current fixtures & equ	15	11-Dec-24	28-Dec-24
HVAC Works		33	13-Nov-24	21-Dec-24
1st fix		23	13-Nov-24	09-Dec-24
K7623	Ducts Works	15	13-Nov-24	30-Nov-24
K7624	Piping Works	15	13-Nov-24	30-Nov-24
K7626	Diffusers & Grills	15	21-Nov-24	08-Dec-24
K7627	Chillers	15	23-Nov-24	09-Dec-24
2nd fix		15	23-Nov-24	09-Dec-24
K7628	AHUs	15	23-Nov-24	09-Dec-24
K7629	Pumps	15	23-Nov-24	09-Dec-24
3rd fix		26	21-Nov-24	21-Dec-24
K7625	Fans installation	15	21-Nov-24	08-Dec-24
K7630	Split units	4	17-Dec-24	21-Dec-24
Fire Fighting Works		65	11-Nov-24	25-Jan-25
1st fix		20	11-Nov-24	03-Dec-24
K7641	Piping & Valves Works	20	11-Nov-24	03-Dec-24
2nd fix		20	17-Nov-24	09-Dec-24
K7642	Sprinklers	20	17-Nov-24	09-Dec-24
3rd fix		18	05-Jan-25	25-Jan-25
K7643	Fire Extinguishers	15	05-Jan-25	21-Jan-25
K7644	Fire hose cabinets	10	14-Jan-25	25-Jan-25
Plumbing Works		49	17-Nov-24	12-Jan-25
1st fix		39	17-Nov-24	31-Dec-24
K7645	Piping Works	20	17-Nov-24	09-Dec-24
K7646	Air Compressors	15	15-Dec-24	31-Dec-24
2nd fix		20	15-Dec-24	06-Jan-25
K7647	Chambers & Manholes	20	15-Dec-24	06-Jan-25
3rd fix		20	21-Dec-24	12-Jan-25
K7648	Plumbing Fixtures	20	21-Dec-24	12-Jan-25
K7649	Floor Drains & Cleanout	15	26-Dec-24	12-Jan-25
Labors Building		210	12-May-24	11-Jan-25
Substructure		82	12-May-24	14-Aug-24
Civil Works		82	12-May-24	14-Aug-24
Earth Works		82	12-May-24	14-Aug-24
K1410	Excavation	8	12-May-24	20-May-24
K1430	Backfilling	11	03-Aug-24	14-Aug-24

	Concrete Works	63	21-May-24	01-Aug-24
	Foundation	30	21-May-24	24-Jun-24
	Formwork	30	21-May-24	24-Jun-24
K1450	Shuttering PC Footing	4	21-May-24	25-May-24
K1460	Deshuttering PC Footing	2	27-May-24	28-May-24
K1470	Shuttering RC Footing	7	29-May-24	05-Jun-24
K1480	Deshuttering RC Footing	5	19-Jun-24	24-Jun-24
	Rft Work	9	06-Jun-24	16-Jun-24
K1490	Steel Fixing RC Footing	9	06-Jun-24	16-Jun-24
	Concrete Pouring Work	21	26-May-24	18-Jun-24
K1500	Placing PC Footing	1	26-May-24	26-May-24
K1510	Placing RC Footing	2	17-Jun-24	18-Jun-24
	Pedestals	23	25-Jun-24	21-Jul-24
	Formwork	15	04-Jul-24	21-Jul-24
K1520	Shuttering Pedestals	5	04-Jul-24	09-Jul-24
K1530	Dehuttering Pedestals	4	17-Jul-24	21-Jul-24
	Rft Work	8	25-Jun-24	03-Jul-24
K1540	Steel Fixing Pedestals	8	25-Jun-24	03-Jul-24
	Concrete Pouring Work	6	10-Jul-24	16-Jul-24
K1550	First Placing Pedestals	2	10-Jul-24	11-Jul-24
K1560	Second Placing Pedestals	2	15-Jul-24	16-Jul-24
	Foundation Insulation	10	22-Jul-24	01-Aug-24
K1570	Foundation Insulation	10	22-Jul-24	01-Aug-24
	Super Strucure	84	13-Jul-24	17-Oct-24
	Ground Floor	77	13-Jul-24	09-Oct-24
	Civil Works	77	13-Jul-24	09-Oct-24
	Steel Works	45	13-Jul-24	02-Sep-24
	Steel Structure Erection	45	13-Jul-24	02-Sep-24
	Steel Columns	31	13-Jul-24	17-Aug-24
K158	Anchor Bolts and Plates	2	13-Jul-24	14-Jul-24
K159	Installing Columns	2	15-Aug-24	17-Aug-24
	Steel Beams	5	18-Aug-24	22-Aug-24
K160	Installing Steel Beams	5	18-Aug-24	22-Aug-24
	Metal Decks	9	24-Aug-24	02-Sep-24
K161	Installing Metal Decks	9	24-Aug-24	02-Sep-24
	Concrete Works	22	15-Sep-24	09-Oct-24
	RC Columns	10	15-Sep-24	25-Sep-24
	Formwork	9	16-Sep-24	25-Sep-24
K162	Shuttering RC Columns	5	16-Sep-24	21-Sep-24
K163	Dehuttering RC Columns	3	23-Sep-24	25-Sep-24
	Rft Work	1	15-Sep-24	15-Sep-24
K164	Steel Fixing RC Columns	1	15-Sep-24	15-Sep-24
	Concrete Pouring Work	1	22-Sep-24	22-Sep-24
K165	Placing RC Columns	1	22-Sep-24	22-Sep-24

Slab on Grade		12	26-Sep-24	09-Oct-24
Formwork		12	26-Sep-24	09-Oct-24
K166	Shuttering SOG	2	26-Sep-24	28-Sep-24
K167	Dehuttering SOG	2	08-Oct-24	09-Oct-24
Rft Work		6	29-Sep-24	05-Oct-24
K168	Steel Fixing SOG	6	29-Sep-24	05-Oct-24
Concrete Pouring Work		2	06-Oct-24	07-Oct-24
K169	Placing SOG	2	06-Oct-24	07-Oct-24
1st Floor		39	03-Sep-24	17-Oct-24
Civil Works		39	03-Sep-24	17-Oct-24
Steel Works		10	03-Sep-24	14-Sep-24
Steel Structure Erection		10	03-Sep-24	14-Sep-24
Steel Columns		1	03-Sep-24	03-Sep-24
K171	Installing Columns	1	03-Sep-24	03-Sep-24
Steel Beams		3	04-Sep-24	07-Sep-24
K172	Installing Steel Beams	3	04-Sep-24	07-Sep-24
Metal Decks		6	08-Sep-24	14-Sep-24
K173	Installing Metal Decks	6	08-Sep-24	14-Sep-24
Concrete Works		19	26-Sep-24	17-Oct-24
RC Columns		7	26-Sep-24	03-Oct-24
Formwork		6	28-Sep-24	03-Oct-24
K174	Shuttering RC Columns	3	28-Sep-24	30-Sep-24
K175	Dehuttering RC Columns	2	02-Oct-24	03-Oct-24
Rft Work		1	26-Sep-24	26-Sep-24
K176	Steel Fixing RC Columns	1	26-Sep-24	26-Sep-24
Concrete Pouring Work		1	01-Oct-24	01-Oct-24
K177	Placing RC Columns	1	01-Oct-24	01-Oct-24
Floor Slab on Grade		12	05-Oct-24	17-Oct-24
Formwork		12	05-Oct-24	17-Oct-24
K178	Shuttering SOG	2	05-Oct-24	06-Oct-24
K179	Dehuttering SOG	2	16-Oct-24	17-Oct-24
Rft Work		6	07-Oct-24	13-Oct-24
K180	Steel Fixing SOG	6	07-Oct-24	13-Oct-24
Concrete Pouring Work		2	14-Oct-24	15-Oct-24
K181	Placing SOG	2	14-Oct-24	15-Oct-24
Roof Slab On Grade		9	05-Oct-24	14-Oct-24
Formwork		9	05-Oct-24	14-Oct-24
K182	Shuttering SOG	2	05-Oct-24	06-Oct-24
K183	Dehuttering SOG	2	13-Oct-24	14-Oct-24
Rft Work		3	07-Oct-24	09-Oct-24
K184	Steel Fixing SOG	3	07-Oct-24	09-Oct-24
Concrete Pouring Work		2	10-Oct-24	12-Oct-24
K185	Placing SOG	2	10-Oct-24	12-Oct-24
Architecture Works		76	15-Oct-24	11-Jan-25
Insulation		5	15-Oct-24	20-Oct-24
K1860	Roof Insulation	5	15-Oct-24	20-Oct-24
Masonry Works		17	19-Oct-24	06-Nov-24
K1870	Masonry Works	17	19-Oct-24	06-Nov-24

Aluminum & Metal Works		2	09-Jan-25	11-Jan-25
K1890	Aliminum Doors and Wind	1	09-Jan-25	09-Jan-25
K1900	Metal Doors	1	09-Jan-25	09-Jan-25
K1880	Metal Lockers	1	11-Jan-25	11-Jan-25
Painting & Plastering		54	07-Nov-24	08-Jan-25
K1920	Internal Walls	4	07-Nov-24	11-Nov-24
K1930	Internal Floor	6	02-Jan-25	08-Jan-25
MEP Works		52	07-Nov-24	06-Jan-25
Electrical Works		33	13-Nov-24	21-Dec-24
1st fix		33	13-Nov-24	21-Dec-24
K7662	Electrical first fix	20	13-Nov-24	05-Dec-24
K7663	Light current cables	20	21-Nov-24	14-Dec-24
K7664	Electric cabling	20	28-Nov-24	21-Dec-24
K7665	Generators	10	02-Dec-24	12-Dec-24
K7666	Transformer	10	02-Dec-24	12-Dec-24
2nd fix		12	05-Dec-24	18-Dec-24
K7667	Wiring devices	10	05-Dec-24	16-Dec-24
K7668	Lighting fixtures	10	08-Dec-24	18-Dec-24
K7669	Light current fixtures & equ	10	08-Dec-24	18-Dec-24
K7670	MV Cable	10	08-Dec-24	18-Dec-24
K7671	Fire Alarm System	10	08-Dec-24	18-Dec-24
HVAC Works		50	10-Nov-24	06-Jan-25
1st fix		18	10-Nov-24	30-Nov-24
K7654	Ducts Works	10	10-Nov-24	20-Nov-24
K7655	Piping Works	10	10-Nov-24	20-Nov-24
K7656	Fans installation	10	18-Nov-24	28-Nov-24
K7657	Diffusers & Grills	10	18-Nov-24	28-Nov-24
K7658	Chillers	10	19-Nov-24	30-Nov-24
2nd fix		42	19-Nov-24	06-Jan-25
K7659	AHUs	10	19-Nov-24	30-Nov-24
K7660	Pumps	10	19-Nov-24	30-Nov-24
K7661	Split units	4	02-Jan-25	06-Jan-25
Fire Fighting Works		50	07-Nov-24	04-Jan-25
1st fix		50	07-Nov-24	04-Jan-25
K7672	Piping & Valves Works	45	07-Nov-24	29-Dec-24
K7673	Sprinklers	45	13-Nov-24	04-Jan-25
2nd fix		18	10-Dec-24	30-Dec-24
K7674	Fire Extinguishers	15	10-Dec-24	26-Dec-24
K7675	Fire hose cabinets	10	19-Dec-24	30-Dec-24
Plumbing Works		46	13-Nov-24	05-Jan-25
1st fix		45	13-Nov-24	04-Jan-25
K7676	Piping Works	45	13-Nov-24	04-Jan-25
K7677	Air Compressors	15	19-Nov-24	05-Dec-24

2nd fix		25	08-Dec-24	05-Jan-25
K7678	Chambers & Manholes	20	08-Dec-24	30-Dec-24
K7679	Plumbing Fixtures	20	14-Dec-24	05-Jan-25
K7680	Floor Drains & Cleanout	15	19-Dec-24	05-Jan-25
Water Tank & Pump Room		90	19-Aug-24	01-Dec-24
Civil Works		88	19-Aug-24	28-Nov-24
Earth Works		48	19-Aug-24	13-Oct-24
K1950	Excavation	4	19-Aug-24	22-Aug-24
K5093	Backfilling	1	13-Oct-24	13-Oct-24
Concrete Works		84	24-Aug-24	28-Nov-24
Foundation		11	24-Aug-24	04-Sep-24
Formwork		11	24-Aug-24	04-Sep-24
K1990	Shuttering PC Raft	1	24-Aug-24	24-Aug-24
K2000	Deshuttering PC Raft	1	26-Aug-24	26-Aug-24
7603	Shuttering RC Raft	2	27-Aug-24	28-Aug-24
K2020	Deshuttering RC Raft	1	04-Sep-24	04-Sep-24
Rft Work		3	29-Aug-24	01-Sep-24
K2030	Steel fixing RC Raft	3	29-Aug-24	01-Sep-24
Concrete Pouring Work		9	25-Aug-24	03-Sep-24
K2040	Placing PC Raft	1	25-Aug-24	25-Aug-24
K2050	Placing RC Raft	1	03-Sep-24	03-Sep-24
Water Stop		1	02-Sep-24	02-Sep-24
K2060	Water Stop Fixing	1	02-Sep-24	02-Sep-24
Walls		16	05-Sep-24	23-Sep-24
Formwork		16	05-Sep-24	23-Sep-24
K2070	Shuttering Walls	6	05-Sep-24	11-Sep-24
K2080	Deshuttering Walls	4	19-Sep-24	23-Sep-24
Rft Work		5	12-Sep-24	17-Sep-24
K2090	Steel Fixing Walls	5	12-Sep-24	17-Sep-24
Concrete Pouring Work		1	18-Sep-24	18-Sep-24
K2100	Placing Walls	1	18-Sep-24	18-Sep-24
Roof Slab		15	12-Nov-24	28-Nov-24
Formwork		15	12-Nov-24	28-Nov-24
K2110	Shuttering Roof Slab	3	12-Nov-24	14-Nov-24
K2120	Deshuttering Roof Slab	2	27-Nov-24	28-Nov-24
Rft Work		4	16-Nov-24	19-Nov-24
K2130	Steel Fixing Roof Slab	4	16-Nov-24	19-Nov-24
Concrete Pouring Work		1	20-Nov-24	20-Nov-24
K2140	Placing Roof Slab	1	20-Nov-24	20-Nov-24
Architecture Works		59	24-Sep-24	01-Dec-24
Metal Works		2	30-Nov-24	01-Dec-24
K2150	Metal Doors and Openninç	2	30-Nov-24	01-Dec-24
Insulation		16	24-Sep-24	12-Oct-24
K2160	Internal Insulation	4	24-Sep-24	28-Sep-24
K2170	Water Test	8	29-Sep-24	07-Oct-24
K2180	External Insulation	4	08-Oct-24	12-Oct-24

MEP Works		25	14-Oct-24	11-Nov-24
1st fix		25	14-Oct-24	11-Nov-24
K7538	Pipings & Fittings	25	14-Oct-24	11-Nov-24
K7539	Pumps Installation	25	14-Oct-24	11-Nov-24
2nd fix		14	14-Oct-24	29-Oct-24
K7540	Ventilation System	7	14-Oct-24	21-Oct-24
K7541	Electrical first fix	7	14-Oct-24	21-Oct-24
K7542	Light Current first fix	7	14-Oct-24	21-Oct-24
K7543	Electrical Cables	7	22-Oct-24	29-Oct-24
Phase 3		8	30-Oct-24	07-Nov-24
K7544	Fire Alarm System	7	30-Oct-24	06-Nov-24
K7545	Fire Extinguishers	1	07-Nov-24	07-Nov-24
Electric Room		97	04-Sep-24	25-Dec-24
Civil Works		38	04-Sep-24	17-Oct-24
Earth Works		15	04-Sep-24	21-Sep-24
K2190	Excavation	1	04-Sep-24	04-Sep-24
K2210	Backfilling	1	21-Sep-24	21-Sep-24
Concrete Works		36	07-Sep-24	17-Oct-24
Foundation		7	07-Sep-24	14-Sep-24
Formwork		7	07-Sep-24	14-Sep-24
K2230	Shuttering PC Footing	1	07-Sep-24	07-Sep-24
K2240	Deshuttering PC Footing	1	09-Sep-24	09-Sep-24
K2250	Shuttering RC Footing	1	10-Sep-24	10-Sep-24
K2260	Deshuttering RC Footing	1	14-Sep-24	14-Sep-24
Rft Work		1	11-Sep-24	11-Sep-24
K2270	Steel Fixing RC Footing	1	11-Sep-24	11-Sep-24
Concrete Pouring Work		5	08-Sep-24	12-Sep-24
K2280	Placing PC Footing	1	08-Sep-24	08-Sep-24
K2290	Placing RC Footing	1	12-Sep-24	12-Sep-24
RC Columns		4	15-Sep-24	18-Sep-24
Formwork		3	16-Sep-24	18-Sep-24
K2300	Shuttering RC Columns	1	16-Sep-24	16-Sep-24
K2310	Dehuttering RC Columns	1	18-Sep-24	18-Sep-24
Rft Work		1	15-Sep-24	15-Sep-24
K2320	Steel Fixing RC Columns	1	15-Sep-24	15-Sep-24
Concrete Pouring Work		1	17-Sep-24	17-Sep-24
K2330	Placing RC Columns	1	17-Sep-24	17-Sep-24
Foundation Insulation		1	19-Sep-24	19-Sep-24
K2340	Foundation Insulation	1	19-Sep-24	19-Sep-24
Roof Slab		10	07-Oct-24	17-Oct-24
Formwork		10	07-Oct-24	17-Oct-24
K2350	Shuttering Roof Slab	2	07-Oct-24	08-Oct-24
K2360	Deshuttering Roof Slab	1	17-Oct-24	17-Oct-24
Rft Work		1	09-Oct-24	09-Oct-24
K2370	Steel Fixing Roof Slab	1	09-Oct-24	09-Oct-24
Concrete Pouring Work		1	10-Oct-24	10-Oct-24
K2380	Placing Roof Slab	1	10-Oct-24	10-Oct-24

Slab on Grade		11	22-Sep-24	03-Oct-24
Formwork		11	22-Sep-24	03-Oct-24
K2390	Shuttering SOG	1	22-Sep-24	22-Sep-24
K2400	Dehuttering SOG	1	03-Oct-24	03-Oct-24
Rft Work		1	23-Sep-24	23-Sep-24
K2410	Steel Fixing SOG	1	23-Sep-24	23-Sep-24
Concrete Pouring Work		1	24-Sep-24	24-Sep-24
K2420	Placing SOG	1	24-Sep-24	24-Sep-24
Architecture Works		59	19-Oct-24	25-Dec-24
Masonry Works		2	19-Oct-24	20-Oct-24
K2440	Masonry Works	2	19-Oct-24	20-Oct-24
Insulation		1	21-Oct-24	21-Oct-24
K2430	Roof Insulation	1	21-Oct-24	21-Oct-24
Painting & Plastering		57	21-Oct-24	25-Dec-24
K2450	Internal Ceiling	1	21-Oct-24	21-Oct-24
K2460	Walls	1	11-Dec-24	11-Dec-24
K2470	Floor	1	12-Dec-24	12-Dec-24
K2480	Facade	1	25-Dec-24	25-Dec-24
MEP Works		43	22-Oct-24	10-Dec-24
Electrical Works		33	22-Oct-24	28-Nov-24
1st fix		25	22-Oct-24	19-Nov-24
K5704	Electrical first fix	20	22-Oct-24	13-Nov-24
K5714	Light current first fix	20	22-Oct-24	13-Nov-24
K5724	Light current cables	20	28-Oct-24	19-Nov-24
K5734	Electric cabling	5	28-Oct-24	02-Nov-24
2nd fix		8	20-Nov-24	28-Nov-24
K5764	Wiring devices	5	20-Nov-24	25-Nov-24
K5804	Fire Alarm System	3	20-Nov-24	23-Nov-24
K5774	Lighting fixtures	1	26-Nov-24	26-Nov-24
K5784	Light current fixtures & equ	2	27-Nov-24	28-Nov-24
Fire Fighting Works		10	30-Nov-24	10-Dec-24
1st fix		1	30-Nov-24	30-Nov-24
K7361	Fire Extinguishers	1	30-Nov-24	30-Nov-24
2nd fix		8	02-Dec-24	10-Dec-24
K7351	Fire System	8	02-Dec-24	10-Dec-24
HVAC Works		7	27-Nov-24	04-Dec-24
K7546	Fans Installation	5	27-Nov-24	02-Dec-24
K7547	Glouvers Installation	5	30-Nov-24	04-Dec-24
Plumbing Works		2	22-Oct-24	23-Oct-24
1st fix		2	22-Oct-24	23-Oct-24
K7331	Piping Works	2	22-Oct-24	23-Oct-24
2nd fix		2	22-Oct-24	23-Oct-24
K7341	Roof Drain	2	22-Oct-24	23-Oct-24

Gas Room		50	05-Sep-24	02-Nov-24
Civil Works		23	05-Sep-24	01-Oct-24
Earth Works		14	05-Sep-24	21-Sep-24
K2490	Excavation	1	05-Sep-24	05-Sep-24
K2510	Backfilling	1	21-Sep-24	21-Sep-24
Concrete Works		22	07-Sep-24	01-Oct-24
Foundation		7	07-Sep-24	14-Sep-24
Formwork		7	07-Sep-24	14-Sep-24
K2530	Shuttering PC Footing	1	07-Sep-24	07-Sep-24
K2540	Deshuttering PC Footing	1	09-Sep-24	09-Sep-24
K2550	Shuttering RC Footing	1	10-Sep-24	10-Sep-24
K2560	Deshuttering RC Footing	1	14-Sep-24	14-Sep-24
Rft Work		1	11-Sep-24	11-Sep-24
K2570	Steel Fixing RC Footing	1	11-Sep-24	11-Sep-24
Concrete Pouring Work		5	08-Sep-24	12-Sep-24
K2580	Placing PC Footing	1	08-Sep-24	08-Sep-24
K2590	Placing RC Footing	1	12-Sep-24	12-Sep-24
RC Columns		4	15-Sep-24	18-Sep-24
Formwork		3	16-Sep-24	18-Sep-24
K2600	Shuttering RC Columns	1	16-Sep-24	16-Sep-24
K2610	Dehuttering RC Columns	1	18-Sep-24	18-Sep-24
Rft Work		1	15-Sep-24	15-Sep-24
K2620	Steel Fixing RC Columns	1	15-Sep-24	15-Sep-24
Concrete Pouring Work		1	17-Sep-24	17-Sep-24
K2630	Placing RC Columns	1	17-Sep-24	17-Sep-24
Foundation Insulation		1	19-Sep-24	19-Sep-24
K2640	Foundation Insulation	1	19-Sep-24	19-Sep-24
Roof Slab		4	28-Sep-24	01-Oct-24
Formwork		4	28-Sep-24	01-Oct-24
K2650	Shuttering Roof Slab	1	28-Sep-24	28-Sep-24
K2660	Deshuttering Roof Slab	1	01-Oct-24	01-Oct-24
Rft Work		1	29-Sep-24	29-Sep-24
K2670	Steel Fixing Roof Slab	1	29-Sep-24	29-Sep-24
Concrete Pouring Work		1	30-Sep-24	30-Sep-24
K2680	Placing Roof Slab	1	30-Sep-24	30-Sep-24
Slab on Grade		3	22-Sep-24	24-Sep-24
Formwork		3	22-Sep-24	24-Sep-24
K2690	Shuttering SOG	1	22-Sep-24	22-Sep-24
K2700	Dehuttering SOG	1	24-Sep-24	24-Sep-24
Rft Work		1	22-Sep-24	22-Sep-24
K2710	Steel Fixing SOG	1	22-Sep-24	22-Sep-24
Concrete Pouring Work		1	23-Sep-24	23-Sep-24
K2720	Placing SOG	1	23-Sep-24	23-Sep-24
Architecture Works		27	02-Oct-24	02-Nov-24
Masonry Works		2	02-Oct-24	03-Oct-24
Insulation		1	05-Oct-24	05-Oct-24
K2740	Roof Insulation	1	05-Oct-24	05-Oct-24

Painting & Plastering		25	05-Oct-24	02-Nov-24
K2750	Internal Ceiling	1	05-Oct-24	05-Oct-24
K2760	Walls	1	30-Oct-24	30-Oct-24
K2770	Floor	1	31-Oct-24	31-Oct-24
K2780	Facade	1	02-Nov-24	02-Nov-24
MEP Works		22	05-Oct-24	29-Oct-24
Electrical Works		15	05-Oct-24	21-Oct-24
K7362	Electrical Works	15	05-Oct-24	21-Oct-24
HVAC Works		5	22-Oct-24	27-Oct-24
K7364	HVAC Works	5	22-Oct-24	27-Oct-24
Fire Fighting Works		5	24-Oct-24	29-Oct-24
K7363	Fire Fighting Works	5	24-Oct-24	29-Oct-24
Plumbing Works		5	22-Oct-24	27-Oct-24
K7365	Plumbing Works	5	22-Oct-24	27-Oct-24
Goods Finish Area		210	04-Jun-24	03-Feb-25
Civil Works		138	04-Jun-24	11-Nov-24
Earth Works		64	04-Jun-24	17-Aug-24
K2790	Excavation	6	04-Jun-24	10-Jun-24
K2810	Backfilling	5	12-Aug-24	17-Aug-24
Concrete Works		115	01-Jul-24	11-Nov-24
Foundation		18	01-Jul-24	21-Jul-24
Formwork		18	01-Jul-24	21-Jul-24
K2830	Shuttering PC Footing	1	01-Jul-24	01-Jul-24
K2840	Deshuttering PC Footing	1	03-Jul-24	03-Jul-24
K2850	Shuttering RC Footing	5	04-Jul-24	09-Jul-24
K2860	Deshuttering RC Footing	3	18-Jul-24	21-Jul-24
Rft Work		6	10-Jul-24	16-Jul-24
K2870	Steel Fixing RC Footing	6	10-Jul-24	16-Jul-24
Concrete Pouring Work		14	02-Jul-24	17-Jul-24
K2880	Placing PC Footing	1	02-Jul-24	02-Jul-24
K2890	Placing RC Footing	1	17-Jul-24	17-Jul-24
Pedestals		15	22-Jul-24	07-Aug-24
Formwork		10	28-Jul-24	07-Aug-24
K2900	Shuttering Pedestals	1	28-Jul-24	28-Jul-24
K2910	Dehuttering Pedestals	1	07-Aug-24	07-Aug-24
Rft Work		5	22-Jul-24	27-Jul-24
K2920	Steel Fixing Pedestals	5	22-Jul-24	27-Jul-24
Concrete Pouring Work		8	29-Jul-24	06-Aug-24
K2930	First Placing Pedestals	1	29-Jul-24	29-Jul-24
K4681	Second Placing Pedestals	1	06-Aug-24	06-Aug-24
Foundation Insulation		3	08-Aug-24	11-Aug-24
K2940	Foundation Insulation	3	08-Aug-24	11-Aug-24
RC Columns		9	09-Oct-24	19-Oct-24
Formwork		6	13-Oct-24	19-Oct-24
K2950	Shuttering RC Columns	3	13-Oct-24	15-Oct-24
K2960	Dehuttering RC Columns	2	17-Oct-24	19-Oct-24

Rft Work		3	09-Oct-24	12-Oct-24
K2970	Steel Fixing RC Columns	3	09-Oct-24	12-Oct-24
Concrete Pouring Work		1	16-Oct-24	16-Oct-24
K2980	Placing RC Columns	1	16-Oct-24	16-Oct-24
Slab on Grade		19	21-Oct-24	11-Nov-24
Formwork		19	21-Oct-24	11-Nov-24
K2990	Shuttering SOG	3	21-Oct-24	23-Oct-24
K3000	Dehuttering SOG	2	10-Nov-24	11-Nov-24
Rft Work		13	24-Oct-24	07-Nov-24
K3010	Steel Fixing SOG	13	24-Oct-24	07-Nov-24
Concrete Pouring Work		1	09-Nov-24	09-Nov-24
K3020	Placing SOG	1	09-Nov-24	09-Nov-24
Steel Works		31	30-Jul-24	03-Sep-24
Steel Structure Erection		31	30-Jul-24	03-Sep-24
Steel Columns		20	30-Jul-24	21-Aug-24
K3030	Anchor Bolts and Plates	6	30-Jul-24	05-Aug-24
K3040	Installing Columns	3	19-Aug-24	21-Aug-24
Girders		4	27-Aug-24	31-Aug-24
K3050	Installing Girders	4	27-Aug-24	31-Aug-24
Purlins		11	22-Aug-24	03-Sep-24
K3060	Installing Side Purlins	4	22-Aug-24	26-Aug-24
K3070	Installing Roof Purlins	3	01-Sep-24	03-Sep-24
Architecture Works		131	04-Sep-24	03-Feb-25
Masonry Works		6	12-Nov-24	18-Nov-24
K3080	Masonry Works	6	12-Nov-24	18-Nov-24
Sandwich Panels Works		30	04-Sep-24	08-Oct-24
K3090	Sandwich Panels Fixation	30	04-Sep-24	08-Oct-24
Aluminum & Metal Works		37	23-Dec-24	03-Feb-25
K3110	Aliminum Doors	2	23-Dec-24	24-Dec-24
K3120	Metal Doors	2	23-Dec-24	24-Dec-24
K3100	Facade Aliminum	5	29-Jan-25	03-Feb-25
Painting & Plastering		3	23-Dec-24	25-Dec-24
K3140	Internal Walls	3	23-Dec-24	25-Dec-24
MEP Works		54	19-Nov-24	20-Jan-25
Electrical Works		35	07-Dec-24	15-Jan-25
1st fix		35	07-Dec-24	15-Jan-25
K6304	Electrical first fix	25	07-Dec-24	04-Jan-25
K6314	Light current first fix	25	07-Dec-24	04-Jan-25
K6334	Electric cabling	25	07-Dec-24	04-Jan-25
K6324	Light current cables	25	18-Dec-24	15-Jan-25
2nd fix		25	07-Dec-24	04-Jan-25
K6364	Wiring devices	25	07-Dec-24	04-Jan-25
K6374	Lighting fixtures	23	09-Dec-24	04-Jan-25
K6384	Light current fixtures & equ	23	09-Dec-24	04-Jan-25
K6404	Fire Alarm System	23	09-Dec-24	04-Jan-25

HVAC Works		39	07-Dec-24	20-Jan-25
1st fix		35	07-Dec-24	15-Jan-25
K6204	Ducts Works	25	07-Dec-24	04-Jan-25
K7385	Fans installation	25	18-Dec-24	15-Jan-25
2nd fix		25	23-Dec-24	20-Jan-25
K7395	Diffusers & Grills	25	23-Dec-24	20-Jan-25
Fire Fighting Works		32	07-Dec-24	12-Jan-25
1st fix		2	07-Dec-24	08-Dec-24
K7405	Fire Extinguishers	2	07-Dec-24	08-Dec-24
2nd fix		32	07-Dec-24	12-Jan-25
K7415	Piping & Valves Works	25	07-Dec-24	04-Jan-25
K7425	Sprinklers	25	15-Dec-24	12-Jan-25
Plumbing Works		15	19-Nov-24	05-Dec-24
1st fix		10	19-Nov-24	30-Nov-24
K6114	Piping Works	10	19-Nov-24	30-Nov-24
2nd fix		10	25-Nov-24	05-Dec-24
K6154	Floor Drains & Cleanout	10	25-Nov-24	05-Dec-24
Admin Area		223	21-May-24	04-Feb-25
Substructure		88	21-May-24	31-Aug-24
Civil Works		88	21-May-24	31-Aug-24
Earth Works		88	21-May-24	31-Aug-24
K3170	Excavation	3	21-May-24	23-May-24
K3190	Backfilling	3	28-Aug-24	31-Aug-24
Concrete Works		32	22-Jul-24	27-Aug-24
Foundation		16	22-Jul-24	08-Aug-24
Formwork		16	22-Jul-24	08-Aug-24
K3210	Shuttering PC Footing	1	22-Jul-24	22-Jul-24
K3220	Deshuttering PC Footing	1	24-Jul-24	24-Jul-24
K3230	Shuttering RC Footing	4	25-Jul-24	29-Jul-24
K3240	Deshuttering RC Footing	3	06-Aug-24	08-Aug-24
Rft Work		5	30-Jul-24	04-Aug-24
K3250	Steel Fixing RC Footing	5	30-Jul-24	04-Aug-24
Concrete Pouring Work		12	23-Jul-24	05-Aug-24
K3260	Placing PC Footing	1	23-Jul-24	23-Jul-24
K3270	Placing RC Footing	1	05-Aug-24	05-Aug-24
Pedestals		13	10-Aug-24	24-Aug-24
Formwork		8	15-Aug-24	24-Aug-24
K3280	Shuttering Pedestals	3	15-Aug-24	18-Aug-24
K3290	Dehuttering Pedestals	2	22-Aug-24	24-Aug-24
Rft Work		5	10-Aug-24	14-Aug-24
K3300	Steel Fixing Pedestals	5	10-Aug-24	14-Aug-24
Concrete Pouring Work		3	19-Aug-24	21-Aug-24
K4682	First Placing Pedestals	1	19-Aug-24	19-Aug-24
K4683	Second Placing Pedestals	1	21-Aug-24	21-Aug-24
Foundation Insulation		3	25-Aug-24	27-Aug-24
K3320	Foundation Insulation	3	25-Aug-24	27-Aug-24

Super Strucure	67	20-Aug-24	05-Nov-24
Ground Floor	55	20-Aug-24	22-Oct-24
Civil Works	55	20-Aug-24	22-Oct-24
Steel Works	31	20-Aug-24	24-Sep-24
Steel Structure Erection	31	20-Aug-24	24-Sep-24
Steel Columns	23	20-Aug-24	15-Sep-24
K333 Anchor Bolts and Plates	1	20-Aug-24	20-Aug-24
K334 Installing Columns	1	15-Sep-24	15-Sep-24
Steel Beams	1	16-Sep-24	16-Sep-24
K335 Installing Steel Beams	1	16-Sep-24	16-Sep-24
Metal Deck	7	17-Sep-24	24-Sep-24
K336 Installing Metal Decks	7	17-Sep-24	24-Sep-24
Concrete Works	13	08-Oct-24	22-Oct-24
RC Columns	11	08-Oct-24	20-Oct-24
Formwork	10	09-Oct-24	20-Oct-24
K337 Shuttering RC Columns	3	09-Oct-24	12-Oct-24
K338 Dehuttering RC Columns	2	19-Oct-24	20-Oct-24
Rft Work	1	08-Oct-24	08-Oct-24
K339 Steel Fixing RC Columns	1	08-Oct-24	08-Oct-24
Concrete Pouring Work	1	17-Oct-24	17-Oct-24
K340 Placing RC Columns	1	17-Oct-24	17-Oct-24
Slab on Grade	13	08-Oct-24	22-Oct-24
Formwork	13	08-Oct-24	22-Oct-24
K341 Shuttering SOG	2	08-Oct-24	09-Oct-24
K342 Dehuttering SOG	1	22-Oct-24	22-Oct-24
Rft Work	2	10-Oct-24	12-Oct-24
K343 Steel Fixing SOG	2	10-Oct-24	12-Oct-24
Concrete Pouring Work	4	17-Oct-24	21-Oct-24
K344 Placing SOG	4	17-Oct-24	21-Oct-24
1st Floor	29	25-Sep-24	28-Oct-24
Civil Works	29	25-Sep-24	28-Oct-24
Steel Works	9	25-Sep-24	05-Oct-24
Steel Structure Erection	9	25-Sep-24	05-Oct-24
Steel Columns	1	25-Sep-24	25-Sep-24
K346 Installing Columns	1	25-Sep-24	25-Sep-24
Steel Beams	1	26-Sep-24	26-Sep-24
K347 Installing Steel Beams	1	26-Sep-24	26-Sep-24
Metal Deck	7	28-Sep-24	05-Oct-24
K348 Installing Metal Decks	7	28-Sep-24	05-Oct-24
Concrete Works	16	10-Oct-24	28-Oct-24
RC Columns	7	21-Oct-24	28-Oct-24
Formwork	6	22-Oct-24	28-Oct-24
K349 Shuttering RC Columns	3	22-Oct-24	24-Oct-24
K350 Dehuttering RC Columns	2	27-Oct-24	28-Oct-24
Rft Work	1	21-Oct-24	21-Oct-24
K351 Steel Fixing RC Columns	1	21-Oct-24	21-Oct-24
Concrete Pouring Work	1	26-Oct-24	26-Oct-24
K352 Placing RC Columns	1	26-Oct-24	26-Oct-24

	Slab on Grade	11	10-Oct-24	22-Oct-24
	Formwork	11	10-Oct-24	22-Oct-24
K353	Shuttering SOG	2	10-Oct-24	12-Oct-24
K354	Dehuttering SOG	1	22-Oct-24	22-Oct-24
	Rft Work	2	13-Oct-24	14-Oct-24
K355	Steel Fixing SOG	2	13-Oct-24	14-Oct-24
	Concrete Pouring Work	4	17-Oct-24	21-Oct-24
K356	Placing SOG	4	17-Oct-24	21-Oct-24
	2nd Floor	27	06-Oct-24	05-Nov-24
	Civil Works	27	06-Oct-24	05-Nov-24
	Steel Works	2	06-Oct-24	07-Oct-24
	Steel Structure Erection	2	06-Oct-24	07-Oct-24
	Steel Columns	1	06-Oct-24	06-Oct-24
K358	Installing Columns	1	06-Oct-24	06-Oct-24
	Steel Bems	1	07-Oct-24	07-Oct-24
K742	Installing Steel Beams	1	07-Oct-24	07-Oct-24
	Concrete Works	21	13-Oct-24	05-Nov-24
	RC Columns	7	29-Oct-24	05-Nov-24
	Formwork	6	30-Oct-24	05-Nov-24
K360	Shuttering RC Columns	3	30-Oct-24	02-Nov-24
K361	Dehuttering RC Columns	2	04-Nov-24	05-Nov-24
	Rft Work	1	29-Oct-24	29-Oct-24
K362	Steel Fixing RC Columns	1	29-Oct-24	29-Oct-24
	Concrete Pouring Work	1	03-Nov-24	03-Nov-24
K363	Placing RC Columns	1	03-Nov-24	03-Nov-24
	Slab on Grade	9	13-Oct-24	22-Oct-24
	Formwork	9	13-Oct-24	22-Oct-24
K364	Shuttering SOG	2	13-Oct-24	14-Oct-24
K365	Dehuttering SOG	1	22-Oct-24	22-Oct-24
	Rft Work	2	15-Oct-24	16-Oct-24
K366	Steel Fixing SOG	2	15-Oct-24	16-Oct-24
	Concrete Pouring Work	4	17-Oct-24	21-Oct-24
K367	Placing SOG	4	17-Oct-24	21-Oct-24
	Architecture Works	78	06-Nov-24	04-Feb-25
	Masonry Works	12	06-Nov-24	19-Nov-24
K3680	Masonry Works	12	06-Nov-24	19-Nov-24
	Aluminum & Metal Works	45	15-Dec-24	04-Feb-25
K3710	Aliminum Doors	2	15-Dec-24	16-Dec-24
K3720	Metal Doors	2	26-Dec-24	28-Dec-24
K3700	Facade Aliminum	6	29-Jan-25	04-Feb-25
	Painting & Plastering	10	15-Dec-24	25-Dec-24
K3740	Internal Walls	8	15-Dec-24	23-Dec-24
K3750	Internal Floor	10	15-Dec-24	25-Dec-24

MEP Works		44	11-Nov-24	31-Dec-24
Electrical Works		44	11-Nov-24	31-Dec-24
1st fix		25	11-Nov-24	09-Dec-24
K6604	Electrical first fix	15	11-Nov-24	27-Nov-24
K6614	Light current first fix	15	11-Nov-24	27-Nov-24
K6634	Electric cabling	15	19-Nov-24	05-Dec-24
K6624	Light current cables	15	23-Nov-24	09-Dec-24
2nd fix		25	03-Dec-24	31-Dec-24
K6664	Wiring devices	15	03-Dec-24	19-Dec-24
K6684	Light current fixtures & equ	15	10-Dec-24	26-Dec-24
K6704	Fire Alarm System	15	10-Dec-24	26-Dec-24
K6674	Lighting fixtures	15	15-Dec-24	31-Dec-24
HVAC Works		29	11-Nov-24	14-Dec-24
1st fix		15	11-Nov-24	27-Nov-24
K6504	Ducts Works	15	11-Nov-24	27-Nov-24
K6514	Piping Works	15	11-Nov-24	27-Nov-24
K7456	Split units	5	21-Nov-24	26-Nov-24
2nd fix		15	27-Nov-24	14-Dec-24
K7436	Fans installation	15	27-Nov-24	14-Dec-24
K7446	Diffusers & Grills	15	27-Nov-24	14-Dec-24
Fire Fighting Works		29	11-Nov-24	14-Dec-24
1st fix		29	11-Nov-24	14-Dec-24
K6464	Piping & Valves Works	15	11-Nov-24	27-Nov-24
K6474	Sprinklers	15	27-Nov-24	14-Dec-24
2nd fix		10	28-Nov-24	09-Dec-24
K6494	Fire hose cabinets	10	28-Nov-24	09-Dec-24
K6484	Fire Extinguishers	2	04-Dec-24	05-Dec-24
Plumbing Works		25	11-Nov-24	09-Dec-24
1st fix		15	11-Nov-24	27-Nov-24
K6414	Piping Works	15	11-Nov-24	27-Nov-24
2nd fix		10	28-Nov-24	09-Dec-24
K6444	Plumbing Fixtures	10	28-Nov-24	09-Dec-24
K6454	Floor Drains & Cleanout	10	28-Nov-24	09-Dec-24
Fences & Guard Rooms		177	24-Sep-24	17-Apr-25
Fence		160	14-Oct-24	17-Apr-25
Civil Works		94	14-Oct-24	30-Jan-25
Earth Works		94	14-Oct-24	30-Jan-25
K3770	Excavation	8	14-Oct-24	22-Oct-24
K3790	Backfilling	7	23-Jan-25	30-Jan-25
Concrete Works		85	16-Oct-24	22-Jan-25
Foundation		32	16-Oct-24	21-Nov-24
Formwork		32	16-Oct-24	21-Nov-24
K3800	Shuttering PC Footing	3	16-Oct-24	19-Oct-24
K3810	Deshuttering PC Footing	2	26-Oct-24	27-Oct-24
K3820	Shuttering RC Footing	10	27-Oct-24	06-Nov-24
K3830	Deshuttering RC Footing	7	14-Nov-24	21-Nov-24

Rft Work		15	28-Oct-24	13-Nov-24
K3840	Steel Fixing RC Footing	15	28-Oct-24	13-Nov-24
Concrete Pouring Work		20	23-Oct-24	14-Nov-24
K3850	Placing PC Footing	2	23-Oct-24	24-Oct-24
K3860	Placing RC Footing	3	12-Nov-24	14-Nov-24
Foundation Insulation		5	18-Jan-25	22-Jan-25
K3870	Foundation Insulation	5	18-Jan-25	22-Jan-25
RC Columns		56	16-Nov-24	19-Jan-25
Formwork		51	21-Nov-24	19-Jan-25
K3880	Shuttering RC Columns	7	21-Nov-24	28-Nov-24
K3890	Dehuttering RC Columns	5	14-Jan-25	19-Jan-25
Rft Work		10	16-Nov-24	26-Nov-24
K3900	Steel Fixing RC Columns	10	16-Nov-24	26-Nov-24
Concrete Pouring Work		2	13-Jan-25	14-Jan-25
K3910	Placing RC Columns	2	13-Jan-25	14-Jan-25
Architecture Works		51	18-Feb-25	17-Apr-25
Masonry Works		30	18-Feb-25	24-Mar-25
K3920	Masonry Works	30	18-Feb-25	24-Mar-25
Gates Erection		10	07-Apr-25	17-Apr-25
K3930	Metal Doors Fixation	10	07-Apr-25	17-Apr-25
Painting and Plastering		11	25-Mar-25	06-Apr-25
K3940	Painting and Plastering	11	25-Mar-25	06-Apr-25
Guard Rooms		79	24-Sep-24	24-Dec-24
Guard Room 1		63	24-Sep-24	05-Dec-24
Civil Works		34	24-Sep-24	02-Nov-24
Earth Works		17	24-Sep-24	13-Oct-24
K3950	Excavation	1	24-Sep-24	24-Sep-24
K7375	Backfilling	1	13-Oct-24	13-Oct-24
Concrete Works		33	25-Sep-24	02-Nov-24
Foundation		10	25-Sep-24	06-Oct-24
Formwork		10	25-Sep-24	06-Oct-24
K399	Shuttering PC Footing	1	25-Sep-24	25-Sep-24
K400	Deshuttering PC Footing	1	28-Sep-24	28-Sep-24
K401	Shuttering RC Footing	3	29-Sep-24	01-Oct-24
K402	Deshuttering RC Footing	2	05-Oct-24	06-Oct-24
Rft Work		1	02-Oct-24	02-Oct-24
K403	Steel Fixing RC Footing	1	02-Oct-24	02-Oct-24
Concrete Pouring Work		7	26-Sep-24	03-Oct-24
K404	Placing PC Footing	1	26-Sep-24	26-Sep-24
K405	Placing RC Footing	1	03-Oct-24	03-Oct-24
Foundation Insulation		1	12-Oct-24	12-Oct-24
K4060	Foundation Insulation	1	12-Oct-24	12-Oct-24
RC Columns		4	07-Oct-24	10-Oct-24
Formwork		3	08-Oct-24	10-Oct-24
K407	Shuttering RC Columns	1	08-Oct-24	08-Oct-24
K408	Dehuttering RC Columns	1	10-Oct-24	10-Oct-24

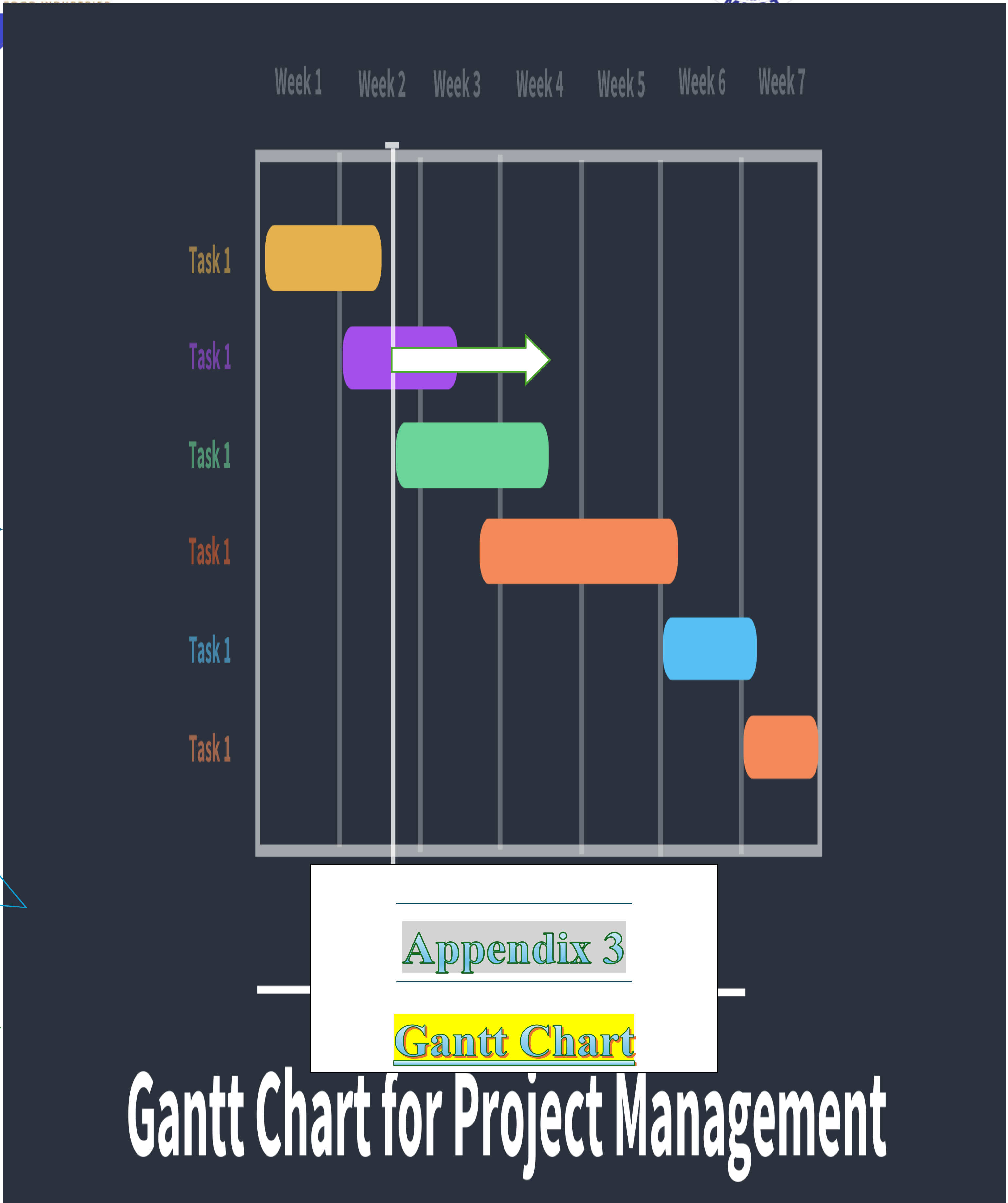
Rft Work		1	07-Oct-24	07-Oct-24
K409	Steel Fixing RC Columns	1	07-Oct-24	07-Oct-24
Concrete Pouring Work		1	09-Oct-24	09-Oct-24
K410	Placing RC Columns	1	09-Oct-24	09-Oct-24
Roof Slab		11	21-Oct-24	02-Nov-24
Formwork		11	21-Oct-24	02-Nov-24
K411	Shuttering Roof Slab	1	21-Oct-24	21-Oct-24
K412	Deshuttering Roof Slab	1	02-Nov-24	02-Nov-24
Rft Work		1	22-Oct-24	22-Oct-24
K413	Steel Fixing Roof Slab	1	22-Oct-24	22-Oct-24
Concrete Pouring Work		1	23-Oct-24	23-Oct-24
K414	Placing Roof Slab	1	23-Oct-24	23-Oct-24
Slab on Grade		4	14-Oct-24	17-Oct-24
Formwork		4	14-Oct-24	17-Oct-24
K415	Shuttering SOG	1	14-Oct-24	14-Oct-24
K416	Dehuttering SOG	1	17-Oct-24	17-Oct-24
Rft Work		1	15-Oct-24	15-Oct-24
K417	Steel Fixing SOG	1	15-Oct-24	15-Oct-24
Concrete Pouring Work		1	16-Oct-24	16-Oct-24
K418	Placing SOG	1	16-Oct-24	16-Oct-24
Architecture Works		29	03-Nov-24	05-Dec-24
Masonry Works		5	03-Nov-24	07-Nov-24
K4190	Masonry Works	5	03-Nov-24	07-Nov-24
Insulation		1	09-Nov-24	09-Nov-24
K4200	Roof Insulation	1	09-Nov-24	09-Nov-24
Painting & Plastering		24	09-Nov-24	05-Dec-24
K4210	Internal Ceiling	1	09-Nov-24	09-Nov-24
K4220	Walls	1	03-Dec-24	03-Dec-24
K4230	Floor	1	04-Dec-24	04-Dec-24
K4240	Facade	1	05-Dec-24	05-Dec-24
MEP Works		22	10-Nov-24	04-Dec-24
Electrical Works		15	10-Nov-24	26-Nov-24
K7466	Electrical Works	15	10-Nov-24	26-Nov-24
HVAC Works		7	27-Nov-24	04-Dec-24
K7486	HVAC Works	7	27-Nov-24	04-Dec-24
Fire Fighting Works		3	30-Nov-24	02-Dec-24
K7476	Fire Fighting Works	3	30-Nov-24	02-Dec-24
Plumbing Works		3	10-Nov-24	12-Nov-24
K7496	Plumbing Works	3	10-Nov-24	12-Nov-24
Guard Room 2		63	13-Oct-24	24-Dec-24
Civil Works		34	13-Oct-24	20-Nov-24
Earth Works		17	13-Oct-24	31-Oct-24
K4250	Excavation	1	13-Oct-24	13-Oct-24
K4270	Backfilling	1	31-Oct-24	31-Oct-24

	Concrete Works	33	14-Oct-24	20-Nov-24
	Foundation	10	14-Oct-24	24-Oct-24
	Formwork	10	14-Oct-24	24-Oct-24
K429	Shuttering PC Footing	1	14-Oct-24	14-Oct-24
K430	Deshuttering PC Footing	1	16-Oct-24	16-Oct-24
K431	Shuttering RC Footing	3	17-Oct-24	20-Oct-24
K432	Deshuttering RC Footing	2	23-Oct-24	24-Oct-24
	Rft Work	1	21-Oct-24	21-Oct-24
K433	Steel Fixing RC Footing	1	21-Oct-24	21-Oct-24
	Concrete Pouring Work	7	15-Oct-24	22-Oct-24
K434	Placing PC Footing	1	15-Oct-24	15-Oct-24
K435	Placing RC Footing	1	22-Oct-24	22-Oct-24
	Foundation Insulation	1	30-Oct-24	30-Oct-24
K4360	Foundation Insulation	1	30-Oct-24	30-Oct-24
	RC Columns	4	26-Oct-24	29-Oct-24
	Formwork	3	27-Oct-24	29-Oct-24
K437	Shuttering RC Columns	1	27-Oct-24	27-Oct-24
K438	Dehuttering RC Columns	1	29-Oct-24	29-Oct-24
	Rft Work	1	26-Oct-24	26-Oct-24
K439	Steel Fixing RC Columns	1	26-Oct-24	26-Oct-24
	Concrete Pouring Work	1	28-Oct-24	28-Oct-24
K440	Placing RC Columns	1	28-Oct-24	28-Oct-24
	Roof Slab	11	09-Nov-24	20-Nov-24
	Formwork	11	09-Nov-24	20-Nov-24
K441	Shuttering Roof Slab	1	09-Nov-24	09-Nov-24
K442	Deshuttering Roof Slab	1	20-Nov-24	20-Nov-24
	Rft Work	1	10-Nov-24	10-Nov-24
K443	Steel Fixing Roof Slab	1	10-Nov-24	10-Nov-24
	Concrete Pouring Work	1	11-Nov-24	11-Nov-24
K444	Placing Roof Slab	1	11-Nov-24	11-Nov-24
	Slab on Grade	4	02-Nov-24	05-Nov-24
	Formwork	4	02-Nov-24	05-Nov-24
K445	Shuttering SOG	1	02-Nov-24	02-Nov-24
K446	Dehuttering SOG	1	05-Nov-24	05-Nov-24
	Rft Work	1	03-Nov-24	03-Nov-24
K447	Steel Fixing SOG	1	03-Nov-24	03-Nov-24
	Concrete Pouring Work	1	04-Nov-24	04-Nov-24
K448	Placing SOG	1	04-Nov-24	04-Nov-24
	Architecture Works	29	21-Nov-24	24-Dec-24
	Masonry Works	5	21-Nov-24	26-Nov-24
K4490	Masonry Works	5	21-Nov-24	26-Nov-24
	Insulation	1	27-Nov-24	27-Nov-24
K4500	Roof Insulation	1	27-Nov-24	27-Nov-24

Painting & Plastering		24	27-Nov-24	24-Dec-24
K4510	Internal Ceiling	1	27-Nov-24	27-Nov-24
K4520	Walls	1	22-Dec-24	22-Dec-24
K4530	Floor	1	23-Dec-24	23-Dec-24
K4540	Facade	1	24-Dec-24	24-Dec-24
MEP Works		22	28-Nov-24	23-Dec-24
Electrical Works		15	28-Nov-24	15-Dec-24
K7506	Electrical Works	15	28-Nov-24	15-Dec-24
HVAC Works		7	16-Dec-24	23-Dec-24
K7526	HVAC Works	7	16-Dec-24	23-Dec-24
Fire Fighting Works		3	18-Dec-24	21-Dec-24
K7516	Fire Fighting Works	3	18-Dec-24	21-Dec-24
Plumbing Works		3	28-Nov-24	01-Dec-24
K7536	Plumbing Works	3	28-Nov-24	01-Dec-24
Road Works		104	23-Oct-24	20-Feb-25
Civil Works		70	23-Oct-24	12-Jan-25
Earth Works		19	23-Oct-24	13-Nov-24
K4550	Backfilling	11	23-Oct-24	04-Nov-24
K7537	Subgrade Perparation	8	05-Nov-24	13-Nov-24
Ramp & Basquel Scale Slab on Grade		11	31-Dec-24	12-Jan-25
Formwork		11	31-Dec-24	12-Jan-25
K4580	Shuttering SOG	2	31-Dec-24	01-Jan-25
K4590	Dehuttering SOG	2	11-Jan-25	12-Jan-25
Rft Work		5	02-Jan-25	07-Jan-25
K4600	Steel Fixing SOG	5	02-Jan-25	07-Jan-25
Concrete Pouring Work		2	08-Jan-25	09-Jan-25
K4610	Placing SOG	2	08-Jan-25	09-Jan-25
Architecture Works		45	31-Dec-24	20-Feb-25
K4620	Concrete Curbs	20	31-Dec-24	22-Jan-25
K4630	Interlock Works	20	06-Jan-25	28-Jan-25
K4640	Wheel stoppers & Ballard	20	29-Jan-25	20-Feb-25
K4650	Planting Works	15	29-Jan-25	15-Feb-25
K4660	Marking & Signs	15	29-Jan-25	15-Feb-25
K4670	Exterior Lighting Fixtures	15	29-Jan-25	15-Feb-25
K4680	Bench Seats	4	29-Jan-25	02-Feb-25

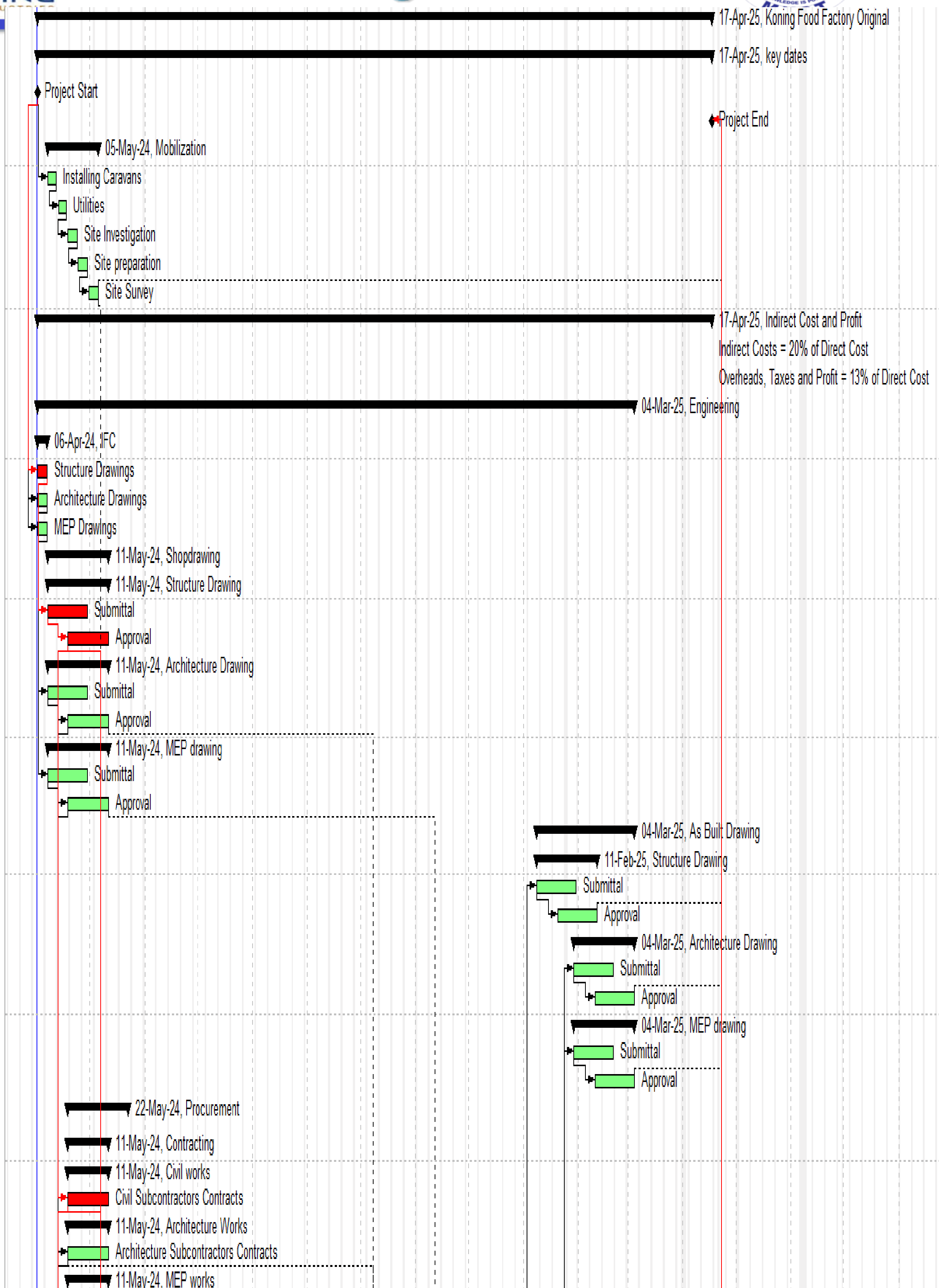
Appendix 3

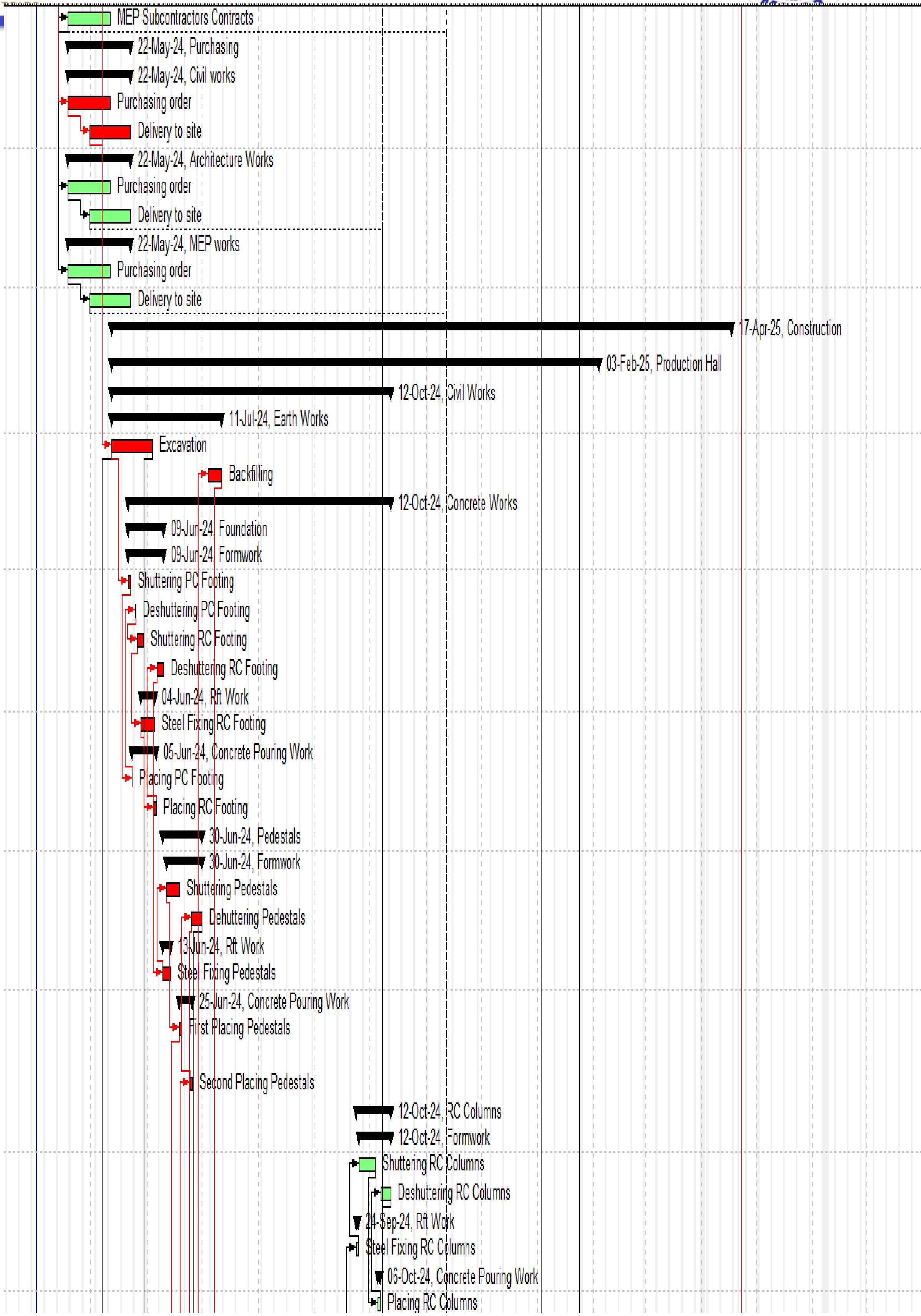
Gantt Chart

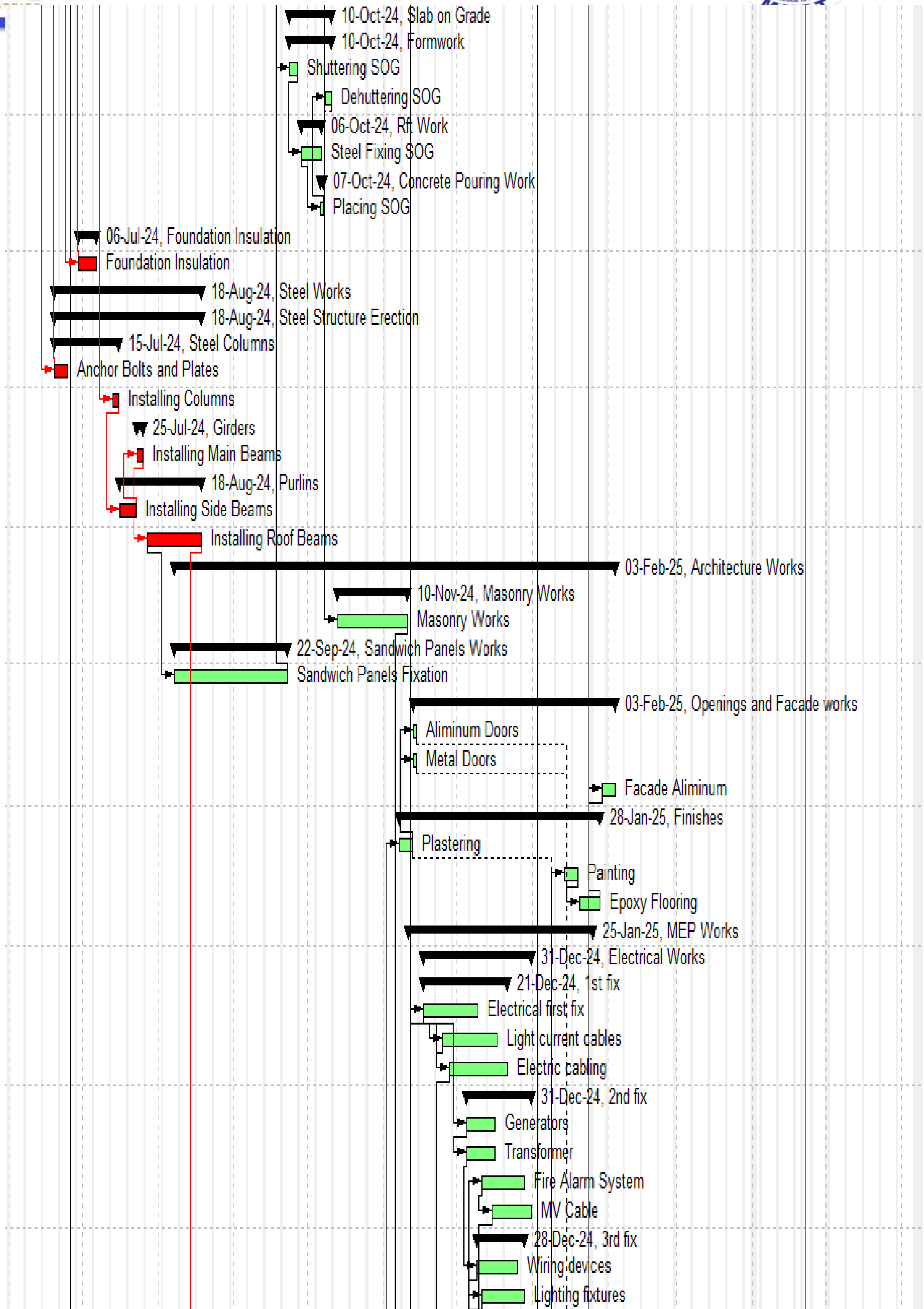


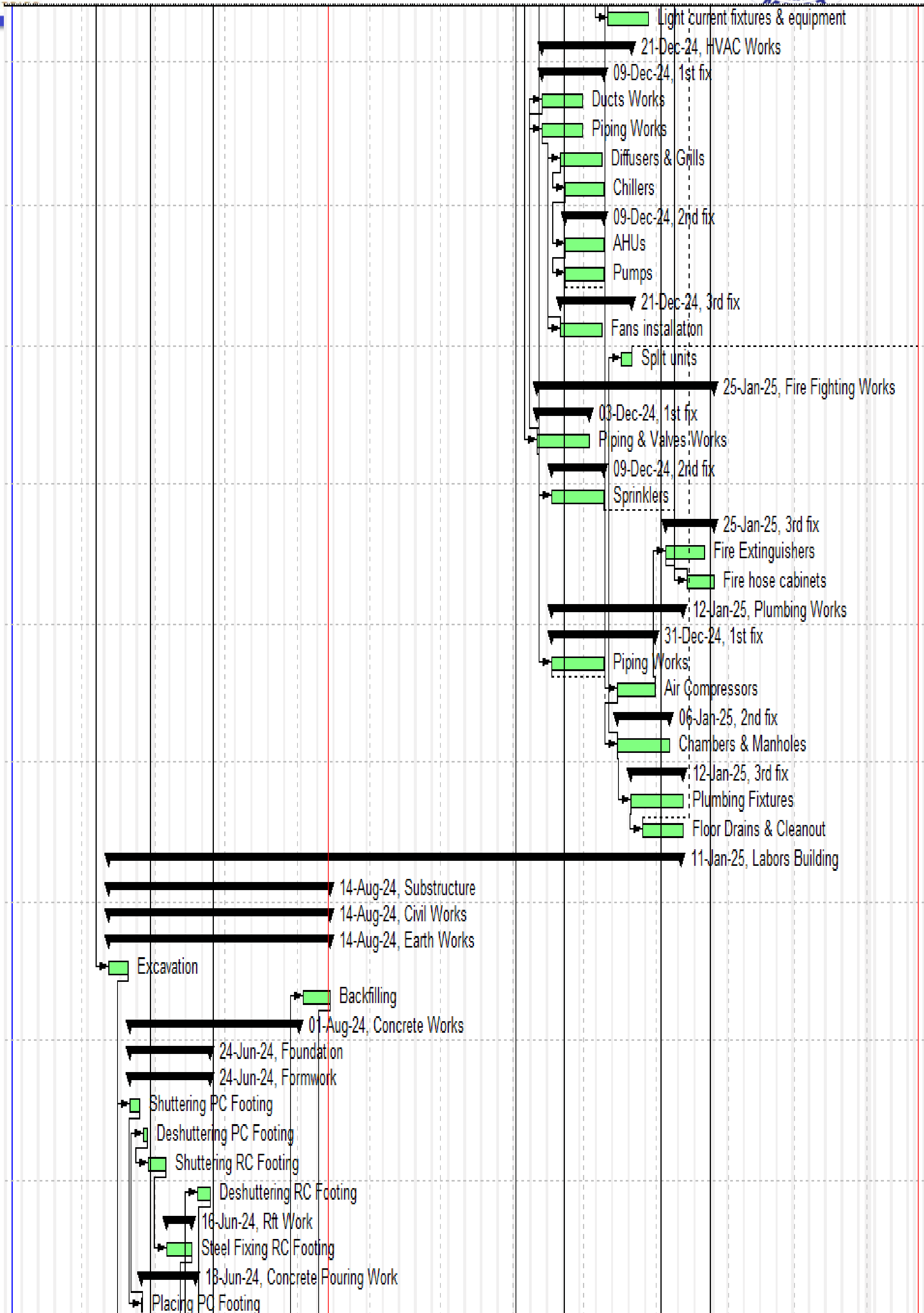
Appendix 3

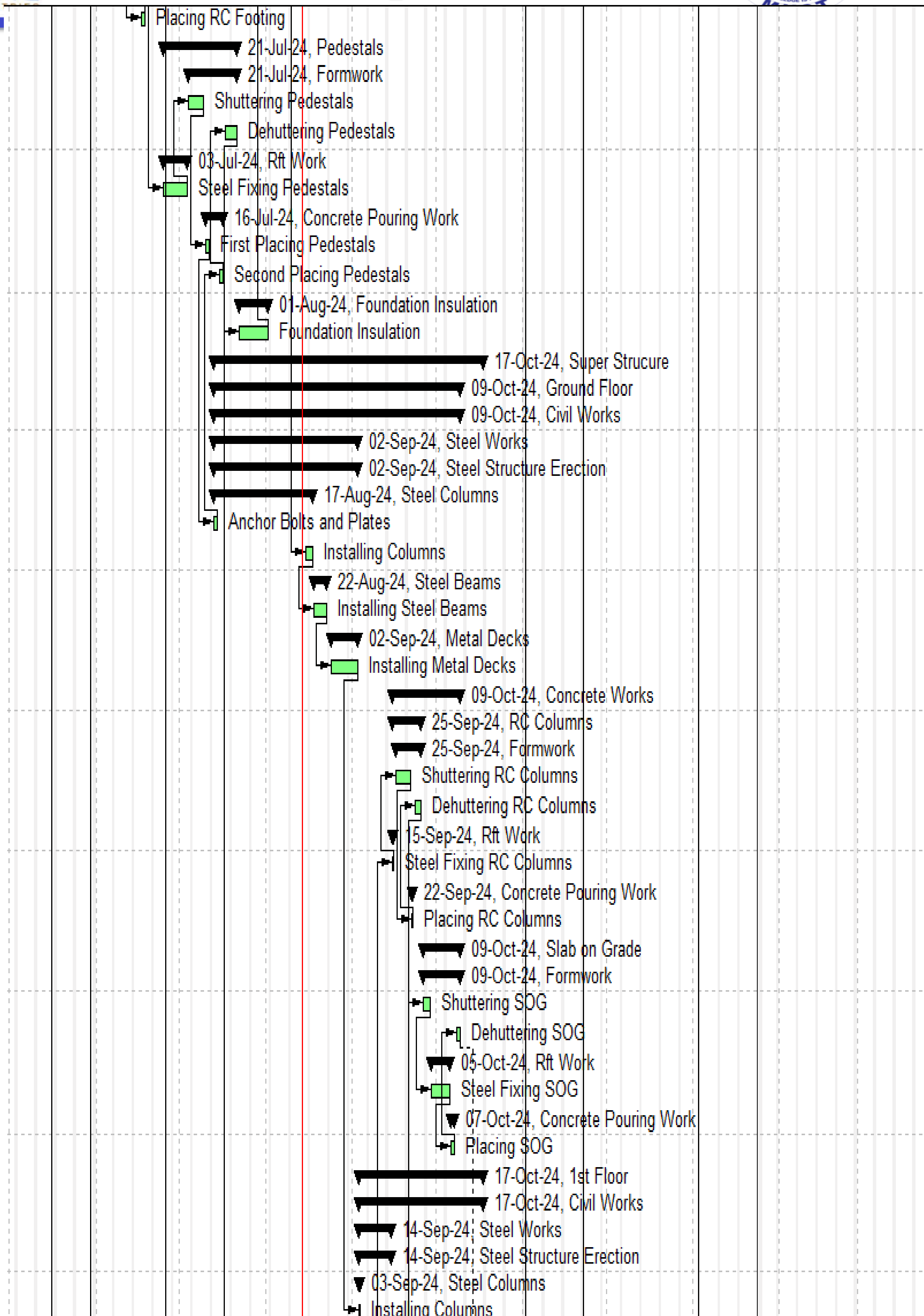
Gantt Chart

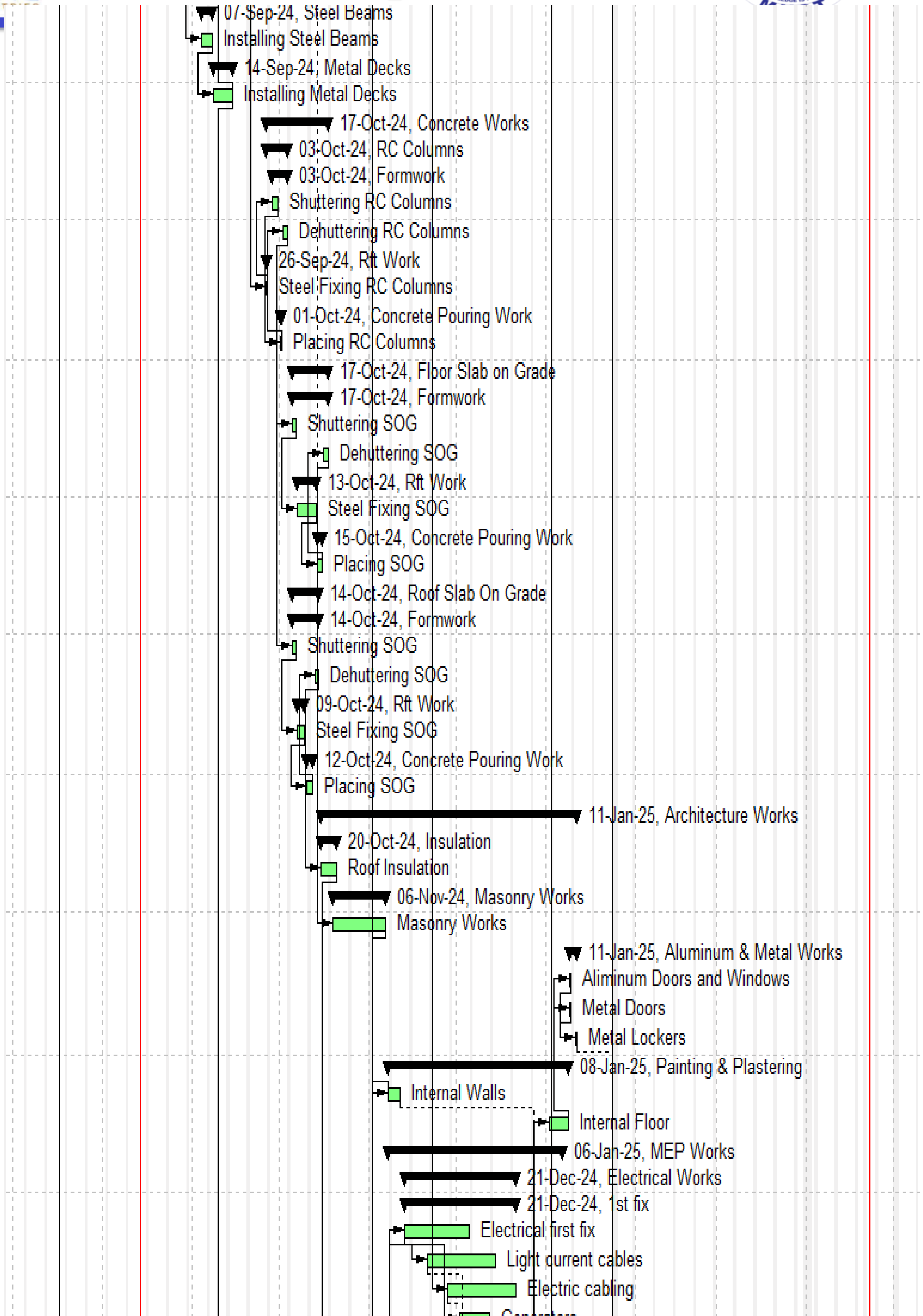

17-Apr-25, Koning Food Factory Original
17-Apr-25, key dates
Project Start
Project End
05-May-24, Mobilization
Installing Caravans
Utilities
Site Investigation
Site preparation
Site Survey
17-Apr-25, Indirect Cost and Profit
Indirect Costs = 20% of Direct Cost
Overheads, Taxes and Profit = 13% of Direct Cost
04-Mar-25, Engineering
06-Apr-24, IFC
Structure Drawings
Architecture Drawings
MEP Drawings
11-May-24, Shopdrawing
11-May-24, Structure Drawing
Submittal
Approval
11-May-24, Architecture Drawing
Submittal
Approval
11-May-24, MEP drawing
Submittal
Approval
04-Mar-25, As Built Drawing
11-Feb-25, Structure Drawing
Submittal
Approval
04-Mar-25, Architecture Drawing
Submittal
Approval
04-Mar-25, MEP drawing
Submittal
Approval
22-May-24, Procurement
11-May-24, Contracting
11-May-24, Civil works
Civil Subcontractors Contracts
11-May-24, Architecture Works
Architecture Subcontractors Contracts
11-May-24, MEP works

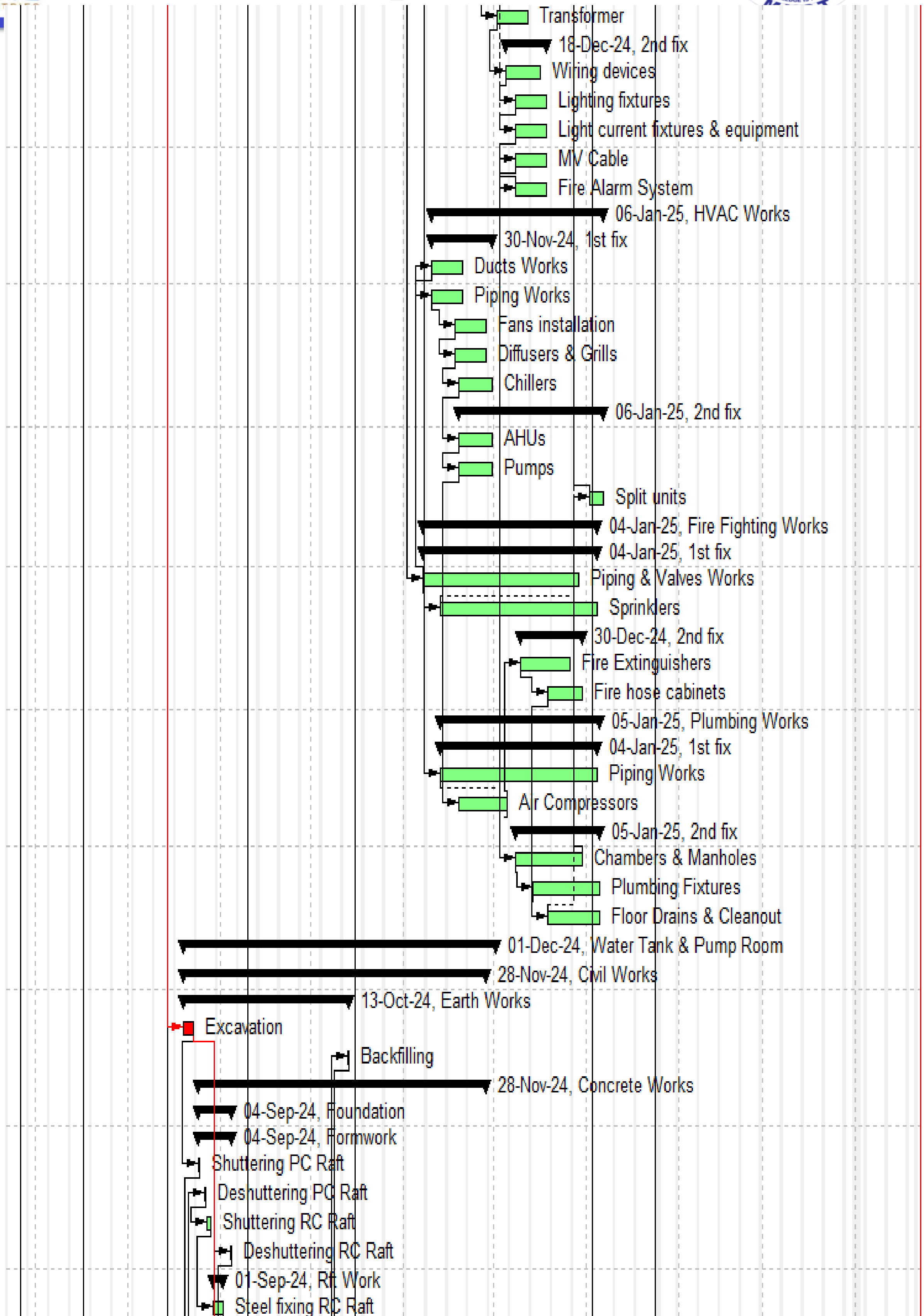

MEP Subcontractors Contracts
22-May-24, Purchasing
22-May-24, Civil works
Purchasing order
Delivery to site
22-May-24, Architecture Works
Purchasing order
Delivery to site
22-May-24, MEP works
Purchasing order
Delivery to site
17-Apr-25, Construction
03-Feb-25, Production Hall
12-Oct-24, Civil Works
11-Jul-24, Earth Works
Excavation
Backfilling
12-Oct-24, Concrete Works
09-Jun-24, Foundation
09-Jun-24, Formwork
Shuttering PC Footing
Deshuttering PC Footing
Shuttering RC Footing
Deshuttering RC Footing
04-Jun-24, Rft Work
Steel Fixing RC Footing
05-Jun-24, Concrete Pouring Work
Placing PC Footing
Placing RC Footing
30-Jun-24, Pedestals
30-Jun-24, Formwork
Shuttering Pedestals
Dehuttering Pedestals
13-Jun-24, Rft Work
Steel Fixing Pedestals
25-Jun-24, Concrete Pouring Work
First Placing Pedestals
Second Placing Pedestals
12-Oct-24, RC Columns
12-Oct-24, Formwork
Shuttering RC Columns
Deshuttering RC Columns
24-Sep-24, Rft Work
Steel Fixing RC Columns
06-Oct-24, Concrete Pouring Work
Placing RC Columns

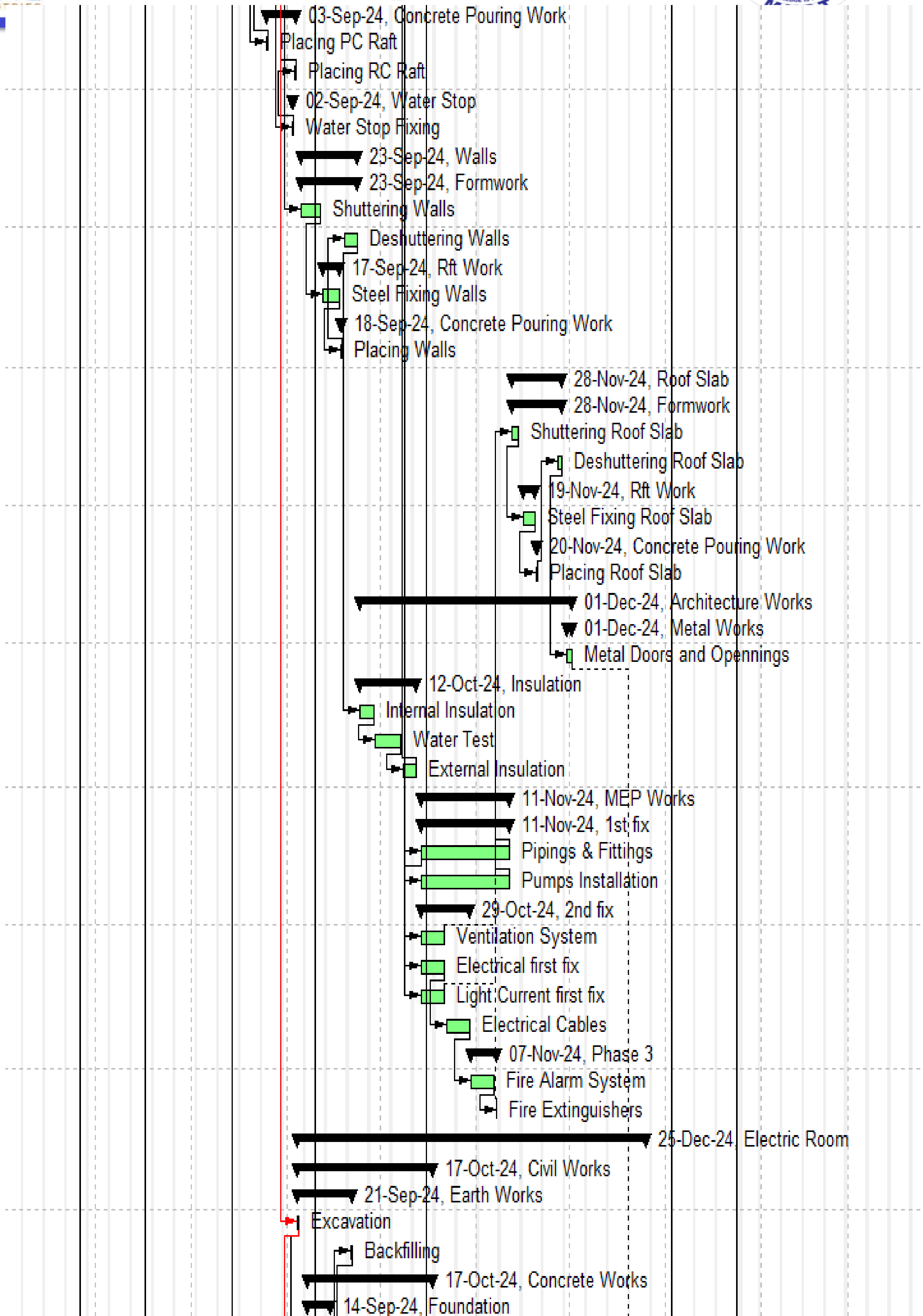

10-Oct-24, Slab on Grade
10-Oct-24, Formwork
Shuttering SOG
Dehuttering SOG
06-Oct-24, Rft Work
Steel Fixing SOG
07-Oct-24, Concrete Pouring Work
Placing SOG
06-Jul-24, Foundation Insulation
Foundation Insulation
18-Aug-24, Steel Works
18-Aug-24, Steel Structure Erection
15-Jul-24, Steel Columns
Anchor Bolts and Plates
Installing Columns
25-Jul-24, Girders
Installing Main Beams
18-Aug-24, Purlins
Installing Side Beams
Installing Roof Beams
03-Feb-25, Architecture Works
10-Nov-24, Masonry Works
Masonry Works
22-Sep-24, Sandwich Panels Works
Sandwich Panels Fixation
03-Feb-25, Openings and Facade works
Aliminum Doors
Metal Doors
Facade Aliminum
28-Jan-25, Finishes
Plastering
Painting
Epoxy Flooring
25-Jan-25, MEP Works
31-Dec-24, Electrical Works
21-Dec-24, 1st fix
Electrical first fix
Light current cables
Electric cabling
31-Dec-24, 2nd fix
Generators
Transformer
Fire Alarm System
MV Cable
28-Dec-24, 3rd fix
Wiring devices
Lighting fixtures


Light current fixtures & equipment
21-Dec-24, HVAC Works
09-Dec-24, 1st fix
Ducts Works
Piping Works
Diffusers & Grills
Chillers
09-Dec-24, 2nd fix
AHUs
Pumps
21-Dec-24, 3rd fix
Fans installation
Split units
25-Jan-25, Fire Fighting Works
03-Dec-24, 1st fix
Piping & Valves Works
09-Dec-24, 2nd fix
Sprinklers
25-Jan-25, 3rd fix
Fire Extinguishers
Fire hose cabinets
12-Jan-25, Plumbing Works
31-Dec-24, 1st fix
Piping Works
Air Compressors
06-Jan-25, 2nd fix
Chambers & Manholes
12-Jan-25, 3rd fix
Plumbing Fixtures
Floor Drains & Cleanout
11-Jan-25, Labors Building
14-Aug-24, Substructure
14-Aug-24, Civil Works
14-Aug-24, Earth Works
Excavation
Backfilling
01-Aug-24, Concrete Works
24-Jun-24, Foundation
24-Jun-24, Formwork
Shuttering PC Footing
Deshuttering PC Footing
Shuttering RC Footing
Deshuttering RC Footing
16-Jun-24, Rft Work
Steel Fixing RC Footing
18-Jun-24, Concrete Pouring Work
Placing PC Footing

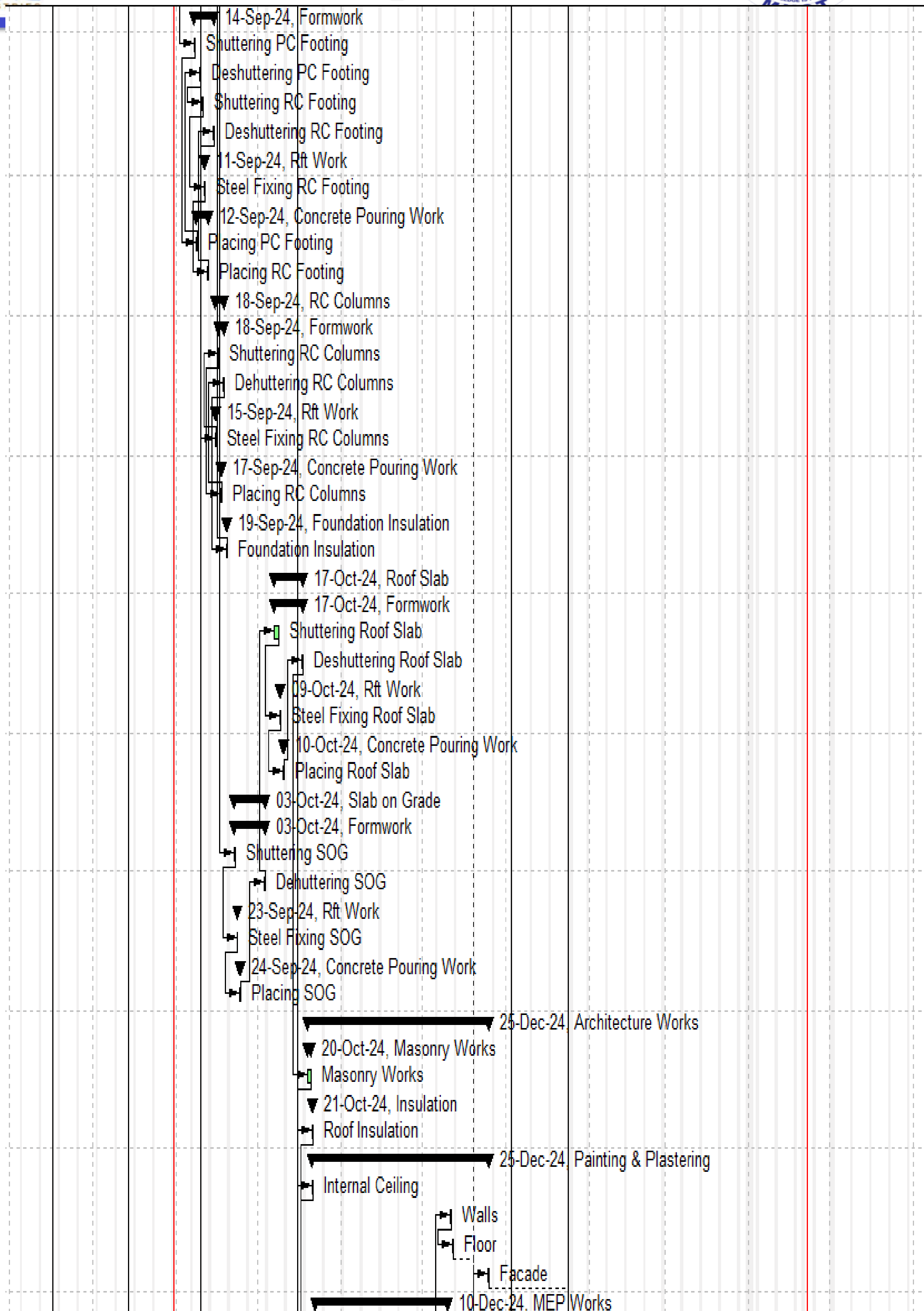

Placing RC Footing
21-Jul-24, Pedestals
21-Jul-24, Formwork
Shuttering Pedestals
Dehuttering Pedestals
03-Jul-24, Rft Work
Steel Fixing Pedestals
16-Jul-24, Concrete Pouring Work
First Placing Pedestals
Second Placing Pedestals
01-Aug-24, Foundation Insulation
Foundation Insulation
17-Oct-24, Super Strucure
09-Oct-24, Ground Floor
09-Oct-24, Civil Works
02-Sep-24, Steel Works
02-Sep-24, Steel Structure Erection
17-Aug-24, Steel Columns
Anchor Bolts and Plates
Installing Columns
22-Aug-24, Steel Beams
Installing Steel Beams
02-Sep-24, Metal Decks
Installing Metal Decks
09-Oct-24, Concrete Works
25-Sep-24, RC Columns
25-Sep-24, Formwork
Shuttering RC Columns
Dehuttering RC Columns
15-Sep-24, Rft Work
Steel Fixing RC Columns
22-Sep-24, Concrete Pouring Work
Placing RC Columns
09-Oct-24, Slab on Grade
09-Oct-24, Formwork
Shuttering SOG
Dehuttering SOG
05-Oct-24, Rft Work
Steel Fixing SOG
07-Oct-24, Concrete Pouring Work
Placing SOG
17-Oct-24, 1st Floor
17-Oct-24, Civil Works
14-Sep-24, Steel Works
14-Sep-24, Steel Structure Erection
03-Sep-24, Steel Columns
Installing Columns

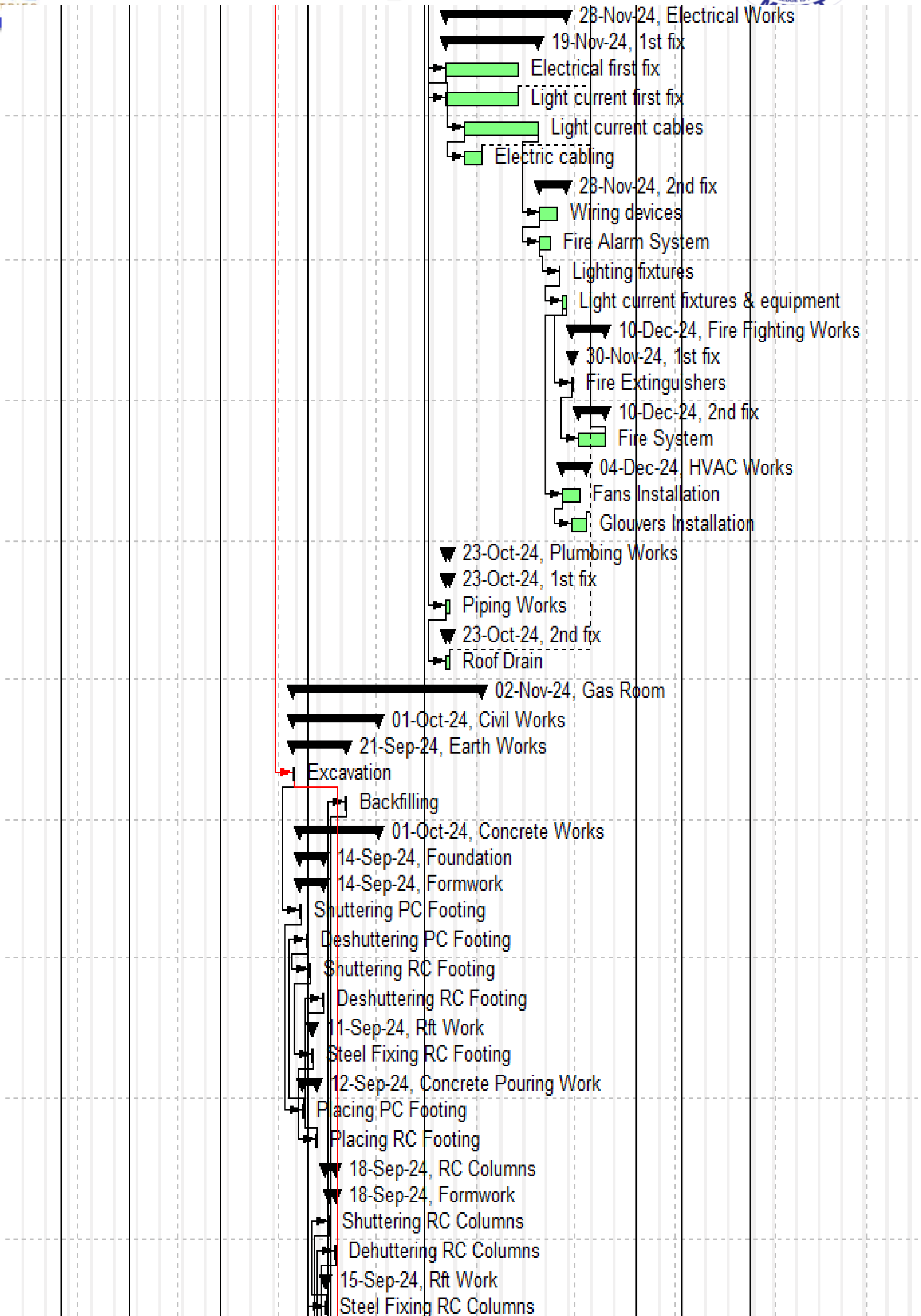

07-Sep-24, Steel Beams
Installing Steel Beams
14-Sep-24, Metal Decks
Installing Metal Decks
17-Oct-24, Concrete Works
03-Oct-24, RC Columns
03-Oct-24, Formwork
Shuttering RC Columns
Dehuttering RC Columns
26-Sep-24, Rft Work
Steel Fixing RC Columns
01-Oct-24, Concrete Pouring Work
Placing RC Columns
17-Oct-24, Floor Slab on Grade
17-Oct-24, Formwork
Shuttering SOG
Dehuttering SOG
13-Oct-24, Rft Work
Steel Fixing SOG
15-Oct-24, Concrete Pouring Work
Placing SOG
14-Oct-24, Roof Slab On Grade
14-Oct-24, Formwork
Shuttering SOG
Dehuttering SOG
09-Oct-24, Rft Work
Steel Fixing SOG
12-Oct-24, Concrete Pouring Work
Placing SOG
11-Jan-25, Architecture Works
20-Oct-24, Insulation
Roof Insulation
06-Nov-24, Masonry Works
Masonry Works
11-Jan-25, Aluminum & Metal Works
Aliminum Doors and Windows
Metal Doors
Metal Lockers
08-Jan-25, Painting & Plastering
Internal Walls
Internal Floor
06-Jan-25, MEP Works
21-Dec-24, Electrical Works
21-Dec-24, 1st fix
Electrical first fix
Light current cables
Electric cabling
Generators

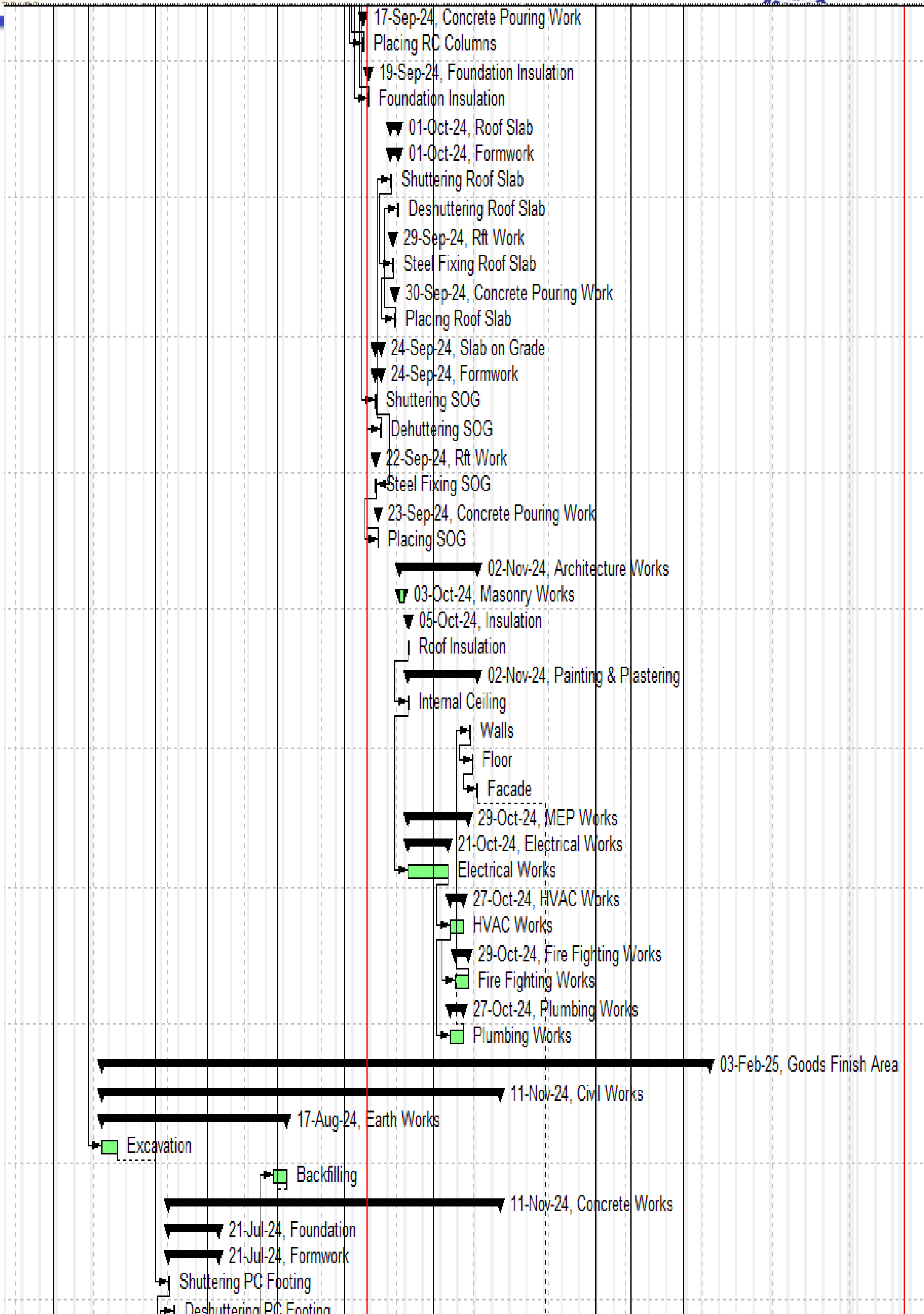

Transformer
18-Dec-24, 2nd fix
Wiring devices
Lighting fixtures
Light current fixtures & equipment
MV Cable
Fire Alarm System
06-Jan-25, HVAC Works
30-Nov-24, 1st fix
Ducts Works
Piping Works
Fans installation
Diffusers & Grills
Chillers
06-Jan-25, 2nd fix
AHUs
Pumps
Split units
04-Jan-25, Fire Fighting Works
04-Jan-25, 1st fix
Piping & Valves Works
Sprinklers
30-Dec-24, 2nd fix
Fire Extinguishers
Fire hose cabinets
05-Jan-25, Plumbing Works
04-Jan-25, 1st fix
Piping Works
Air Compressors
05-Jan-25, 2nd fix
Chambers & Manholes
Plumbing Fixtures
Floor Drains & Cleanout
01-Dec-24, Water Tank & Pump Room
28-Nov-24, Civil Works
13-Oct-24, Earth Works
Excavation
Backfilling
28-Nov-24, Concrete Works
04-Sep-24, Foundation
04-Sep-24, Formwork
Shuttering PC Raft
Deshuttering PC Raft
Shuttering RC Raft
Deshuttering RC Raft
01-Sep-24, Rft Work
Steel fixing RC Raft

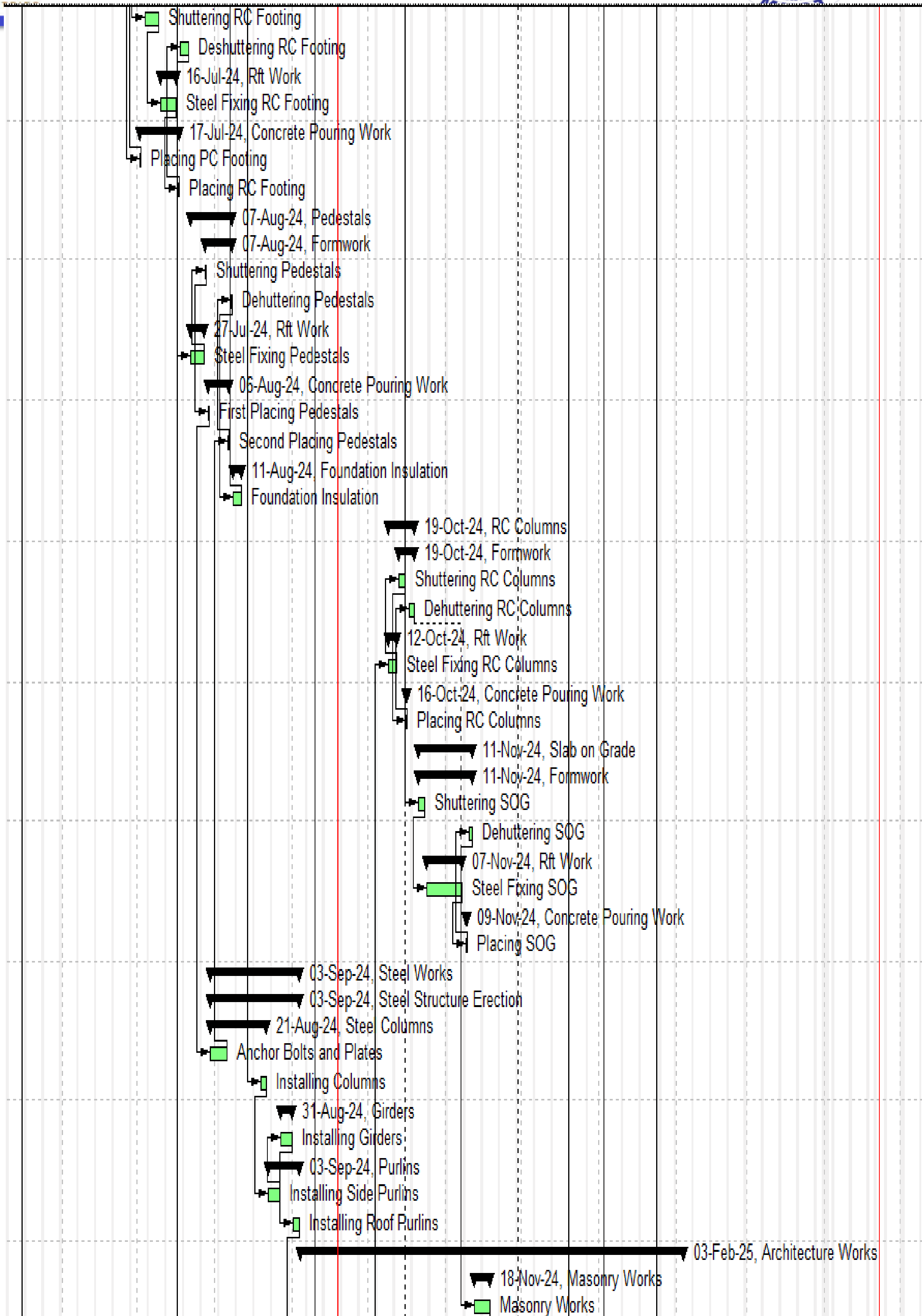


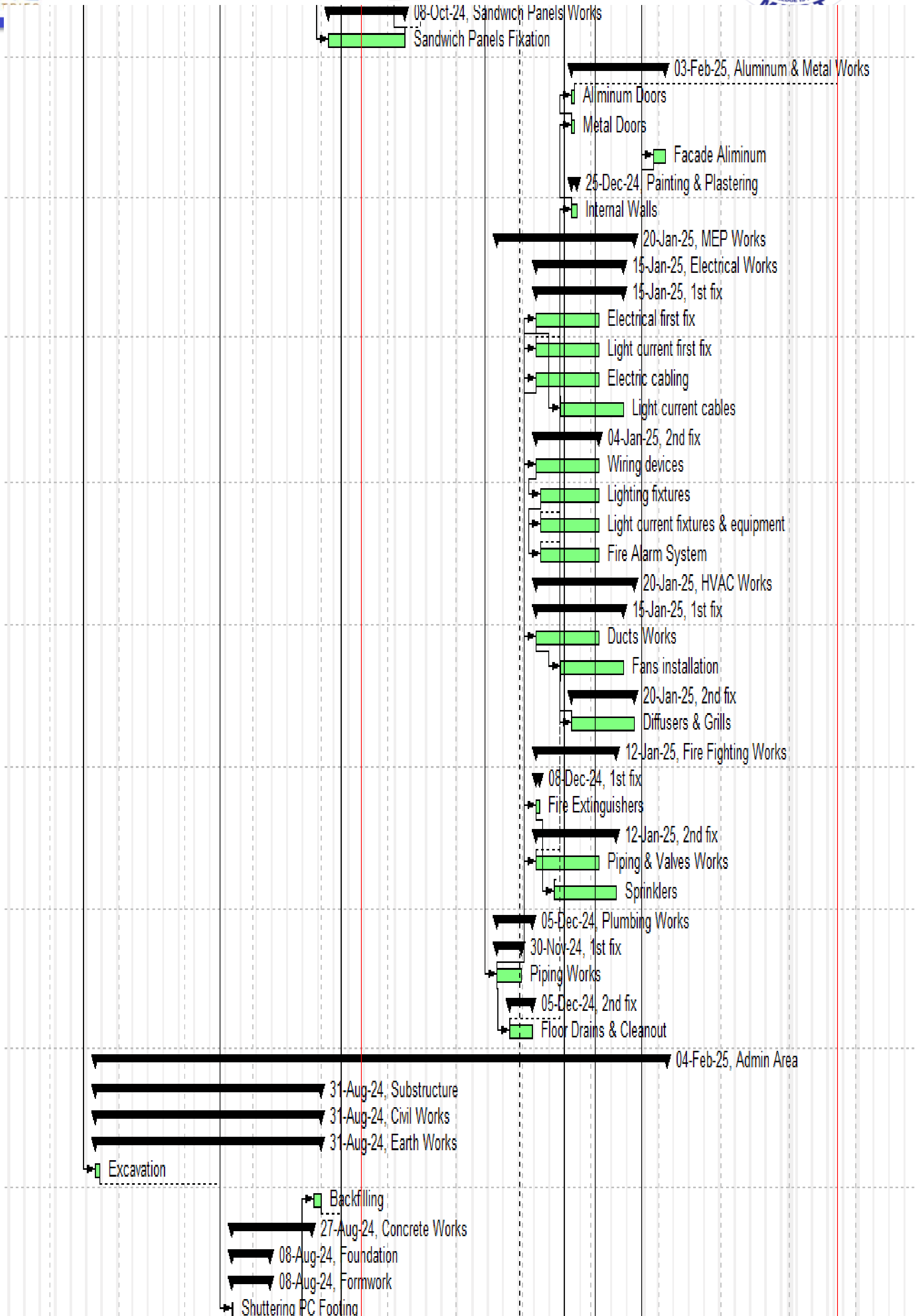
03-Sep-24, Concrete Pouring Work
Placing PC Raft
Placing RC Raft
02-Sep-24, Water Stop
Water Stop Fixing
23-Sep-24, Walls
23-Sep-24, Formwork
Shuttering Walls
Deshuttering Walls
17-Sep-24, Rft Work
Steel Fixing Walls
18-Sep-24, Concrete Pouring Work
Placing Walls
28-Nov-24, Roof Slab
28-Nov-24, Formwork
Shuttering Roof Slab
Deshuttering Roof Slab
19-Nov-24, Rft Work
Steel Fixing Roof Slab
20-Nov-24, Concrete Pouring Work
Placing Roof Slab
01-Dec-24, Architecture Works
01-Dec-24, Metal Works
Metal Doors and Opennings
12-Oct-24, Insulation
Internal Insulation
Water Test
External Insulation
11-Nov-24, MEP Works
11-Nov-24, 1st fix
Pipings & Fittings
Pumps Installation
29-Oct-24, 2nd fix
Ventilation System
Electrical first fix
Light Current first fix
Electrical Cables
07-Nov-24, Phase 3
Fire Alarm System
Fire Extinguishers
25-Dec-24, Electric Room
17-Oct-24, Civil Works
21-Sep-24, Earth Works
Excavation
Backfilling
17-Oct-24, Concrete Works
14-Sep-24, Foundation

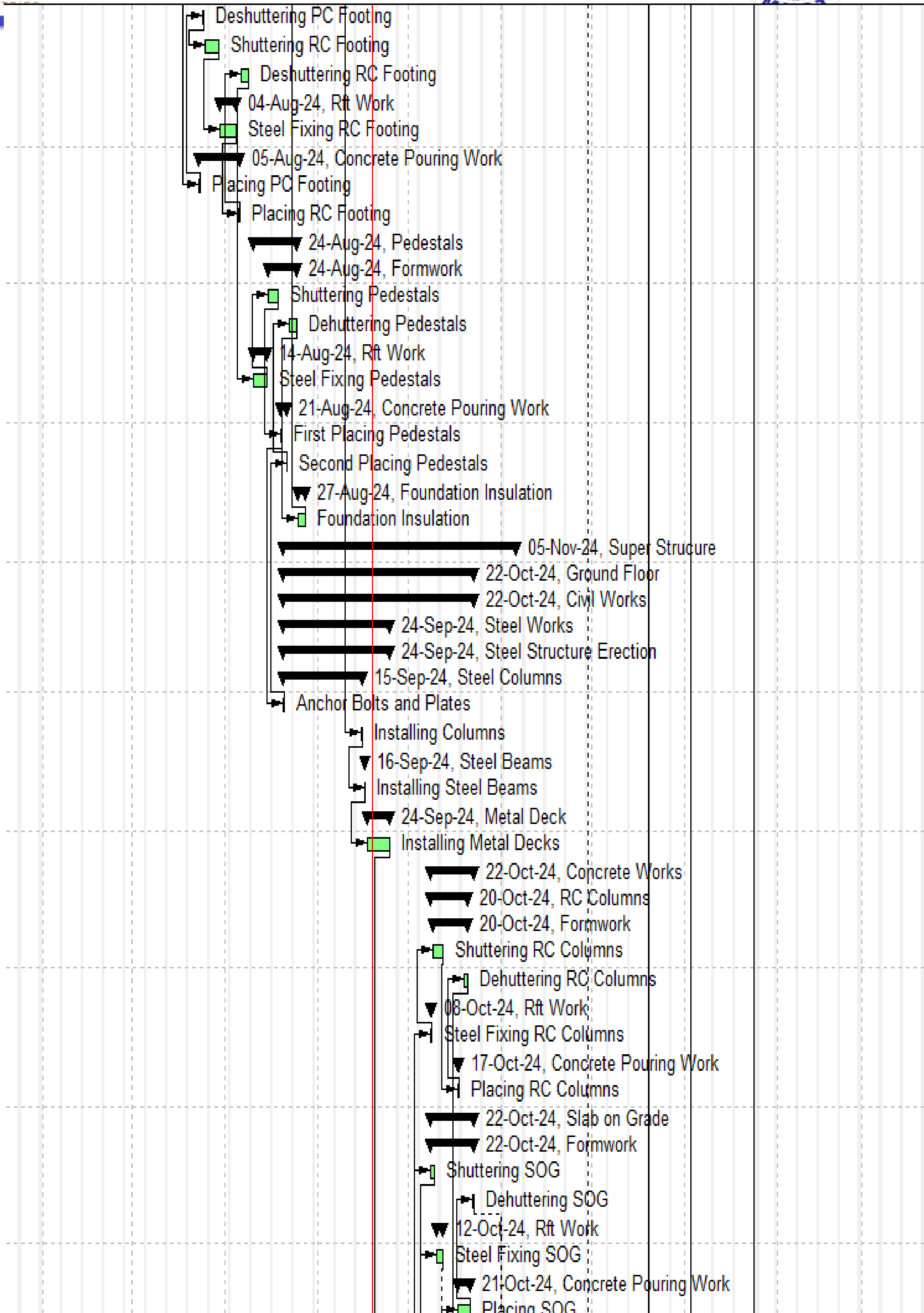

14-Sep-24, Formwork
Shuttering PC Footing
Deshuttering PC Footing
Shuttering RC Footing
Deshuttering RC Footing
11-Sep-24, Rft Work
Steel Fixing RC Footing
12-Sep-24, Concrete Pouring Work
Placing PC Footing
Placing RC Footing
18-Sep-24, RC Columns
18-Sep-24, Formwork
Shuttering RC Columns
Dehuttering RC Columns
15-Sep-24, Rft Work
Steel Fixing RC Columns
17-Sep-24, Concrete Pouring Work
Placing RC Columns
19-Sep-24, Foundation Insulation
Foundation Insulation
17-Oct-24, Roof Slab
17-Oct-24, Formwork
Shuttering Roof Slab
Deshuttering Roof Slab
09-Oct-24, Rft Work
Steel Fixing Roof Slab
10-Oct-24, Concrete Pouring Work
Placing Roof Slab
03-Oct-24, Slab on Grade
03-Oct-24, Formwork
Shuttering SOG
Dehuttering SOG
23-Sep-24, Rft Work
Steel Fixing SOG
24-Sep-24, Concrete Pouring Work
Placing SOG
25-Dec-24, Architecture Works
20-Oct-24, Masonry Works
Masonry Works
21-Oct-24, Insulation
Roof Insulation
25-Dec-24, Painting & Plastering
Internal Ceiling
Walls
Floor
Facade
10-Dec-24, MEP Works

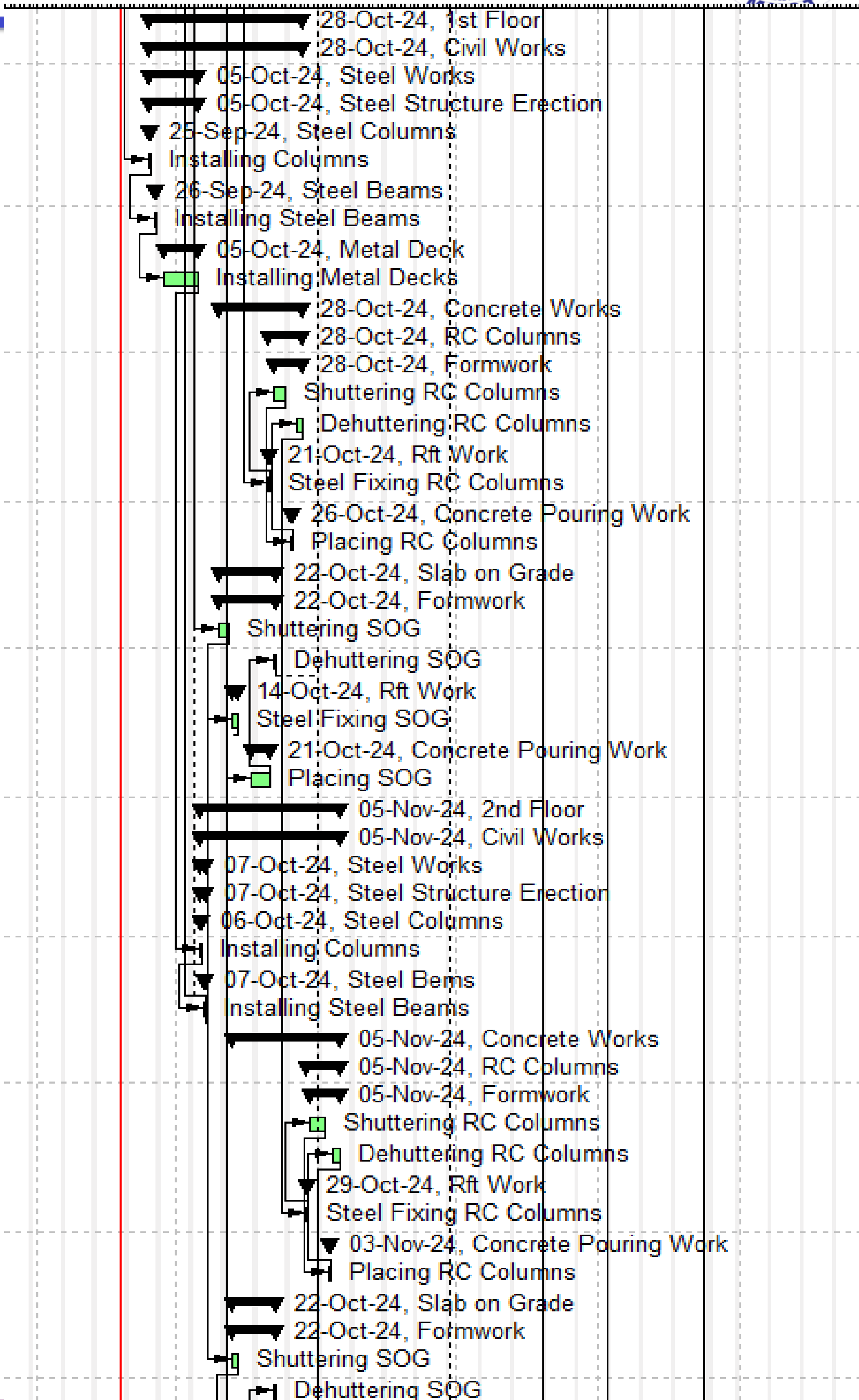

28-Nov-24, Electrical Works
19-Nov-24, 1st fix
Electrical first fix
Light current first fix
Light current cables
Electric cabling
28-Nov-24, 2nd fix
Wiring devices
Fire Alarm System
Lighting fixtures
Light current fixtures & equipment
10-Dec-24, Fire Fighting Works
30-Nov-24, 1st fix
Fire Extinguishers
10-Dec-24, 2nd fix
Fire System
04-Dec-24, HVAC Works
Fans Installation
Glouvers Installation
23-Oct-24, Plumbing Works
23-Oct-24, 1st fix
Piping Works
23-Oct-24, 2nd fix
Roof Drain
02-Nov-24, Gas Room
01-Oct-24, Civil Works
21-Sep-24, Earth Works
Excavation
Backfilling
01-Oct-24, Concrete Works
14-Sep-24, Foundation
14-Sep-24, Formwork
Shuttering PC Footing
Deshuttering PC Footing
Shuttering RC Footing
Deshuttering RC Footing
11-Sep-24, Rft Work
Steel Fixing RC Footing
12-Sep-24, Concrete Pouring Work
Placing PC Footing
Placing RC Footing
18-Sep-24, RC Columns
18-Sep-24, Formwork
Shuttering RC Columns
Dehuttering RC Columns
15-Sep-24, Rft Work
Steel Fixing RC Columns

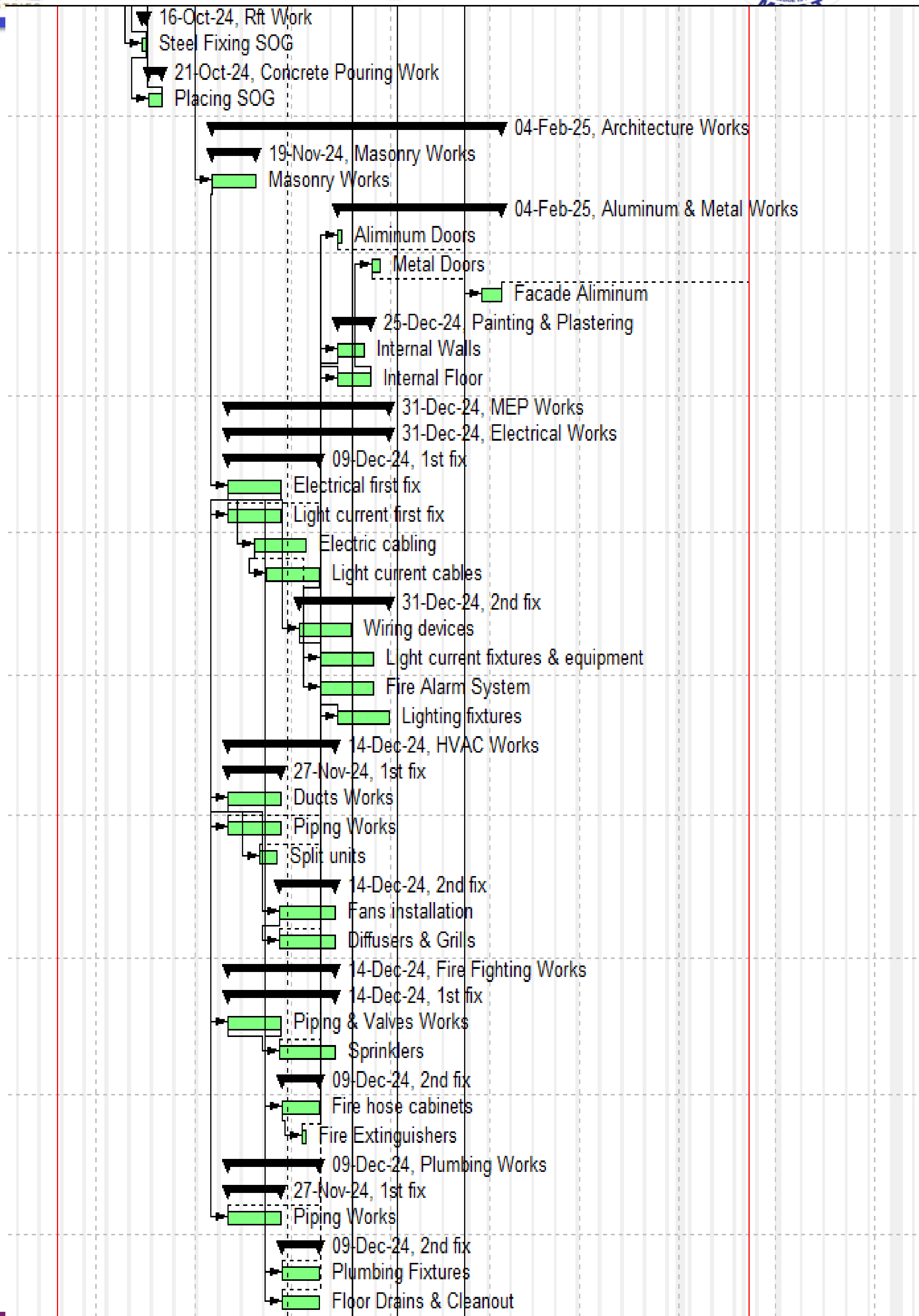

17-Sep-24, Concrete Pouring Work
Placing RC Columns
19-Sep-24, Foundation Insulation
Foundation Insulation
01-Oct-24, Roof Slab
01-Oct-24, Formwork
Shuttering Roof Slab
Deshuttering Roof Slab
29-Sep-24, Rft Work
Steel Fixing Roof Slab
30-Sep-24, Concrete Pouring Work
Placing Roof Slab
24-Sep-24, Slab on Grade
24-Sep-24, Formwork
Shuttering SOG
Dehuttering SOG
22-Sep-24, Rft Work
Steel Fixing SOG
23-Sep-24, Concrete Pouring Work
Placing SOG
02-Nov-24, Architecture Works
03-Oct-24, Masonry Works
05-Oct-24, Insulation
Roof Insulation
02-Nov-24, Painting & Plastering
Internal Ceiling
Walls
Floor
Facade
29-Oct-24, MEP Works
21-Oct-24, Electrical Works
Electrical Works
27-Oct-24, HVAC Works
HVAC Works
29-Oct-24, Fire Fighting Works
Fire Fighting Works
27-Oct-24, Plumbing Works
Plumbing Works
03-Feb-25, Goods Finish Area
11-Nov-24, Civil Works
17-Aug-24, Earth Works
Excavation
Backfilling
11-Nov-24, Concrete Works
21-Jul-24, Foundation
21-Jul-24, Formwork
Shuttering PC Footing
Deshuttering PC Footing

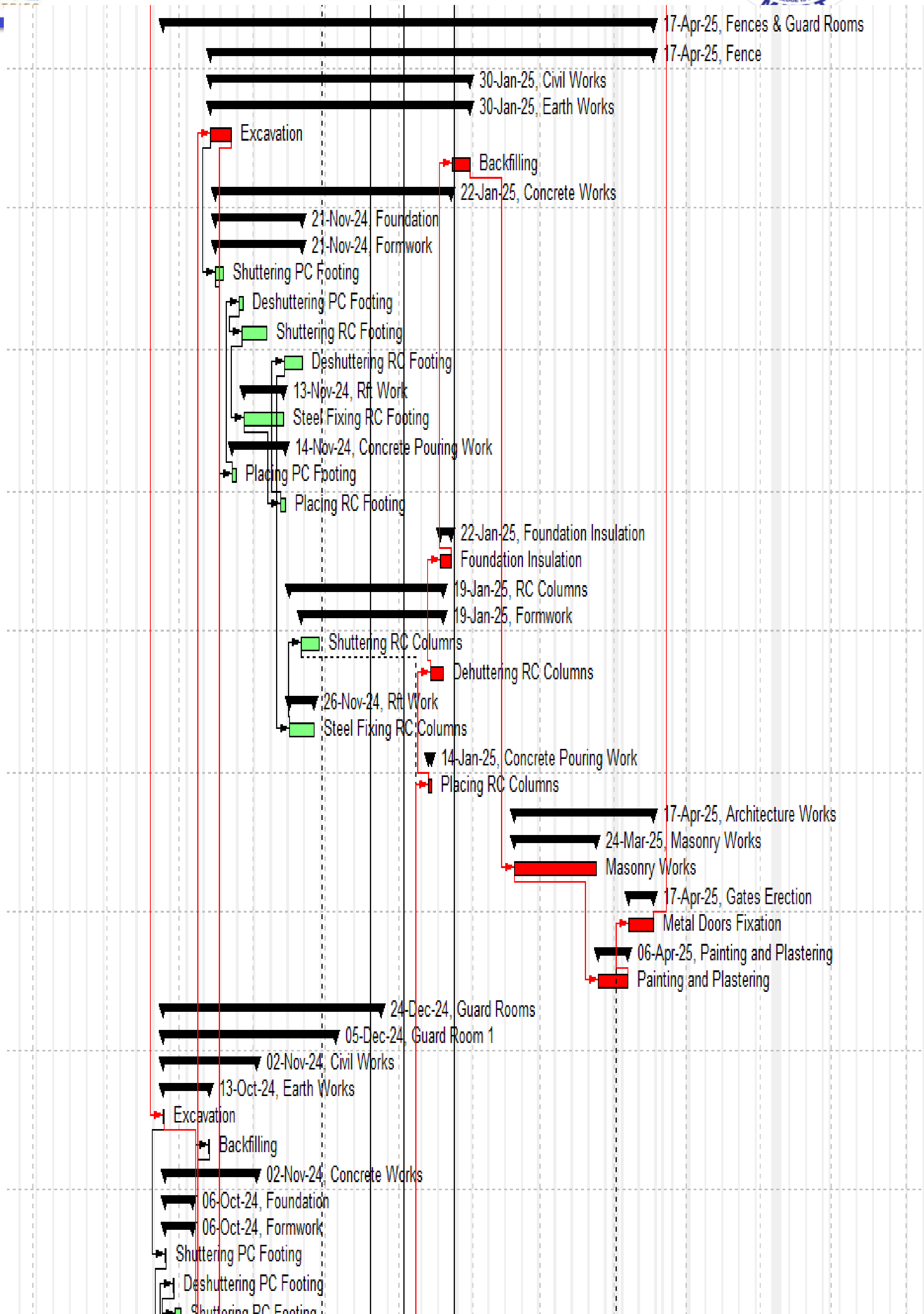

Shuttering RC Footing
Deshuttering RC Footing
16-Jul-24, Rft Work
Steel Fixing RC Footing
17-Jul-24, Concrete Pouring Work
Placing PC Footing
Placing RC Footing
07-Aug-24, Pedestals
07-Aug-24, Formwork
Shuttering Pedestals
Dehuttering Pedestals
27-Jul-24, Rft Work
Steel Fixing Pedestals
06-Aug-24, Concrete Pouring Work
First Placing Pedestals
Second Placing Pedestals
11-Aug-24, Foundation Insulation
Foundation Insulation
19-Oct-24, RC Columns
19-Oct-24, Formwork
Shuttering RC Columns
Dehuttering RC Columns
12-Oct-24, Rft Work
Steel Fixing RC Columns
16-Oct-24, Concrete Pouring Work
Placing RC Columns
11-Nov-24, Slab on Grade
11-Nov-24, Formwork
Shuttering SOG
Dehuttering SOG
07-Nov-24, Rft Work
Steel Fixing SOG
09-Nov-24, Concrete Pouring Work
Placing SOG
03-Sep-24, Steel Works
03-Sep-24, Steel Structure Erection
21-Aug-24, Steel Columns
Anchor Bolts and Plates
Installing Columns
31-Aug-24, Girders
Installing Girders
03-Sep-24, Purlins
Installing Side Purlins
Installing Roof Purlins
03-Feb-25, Architecture Works
18-Nov-24, Masonry Works
Masonry Works


08-Oct-24, Sandwich Panels Works
Sandwich Panels Fixation
03-Feb-25, Aluminum & Metal Works
Alminum Doors
Metal Doors
Facade Aliminum
25-Dec-24, Painting & Plastering
Internal Walls
20-Jan-25, MEP Works
15-Jan-25, Electrical Works
15-Jan-25, 1st fix
Electrical first fix
Light current first fix
Electric cabling
Light current cables
04-Jan-25, 2nd fix
Wiring devices
Lighting fixtures
Light current fixtures & equipment
Fire Alarm System
20-Jan-25, HVAC Works
15-Jan-25, 1st fix
Ducts Works
Fans installation
20-Jan-25, 2nd fix
Diffusers & Grills
12-Jan-25, Fire Fighting Works
08-Dec-24, 1st fix
Fire Extinguishers
12-Jan-25, 2nd fix
Piping & Valves Works
Sprinklers
05-Dec-24, Plumbing Works
30-Nov-24, 1st fix
Piping Works
05-Dec-24, 2nd fix
Floor Drains & Cleanout
04-Feb-25, Admin Area
31-Aug-24, Substructure
31-Aug-24, Civil Works
31-Aug-24, Earth Works
Excavation
Backfilling
27-Aug-24, Concrete Works
08-Aug-24, Foundation
08-Aug-24, Formwork
Shuttering PC Footing

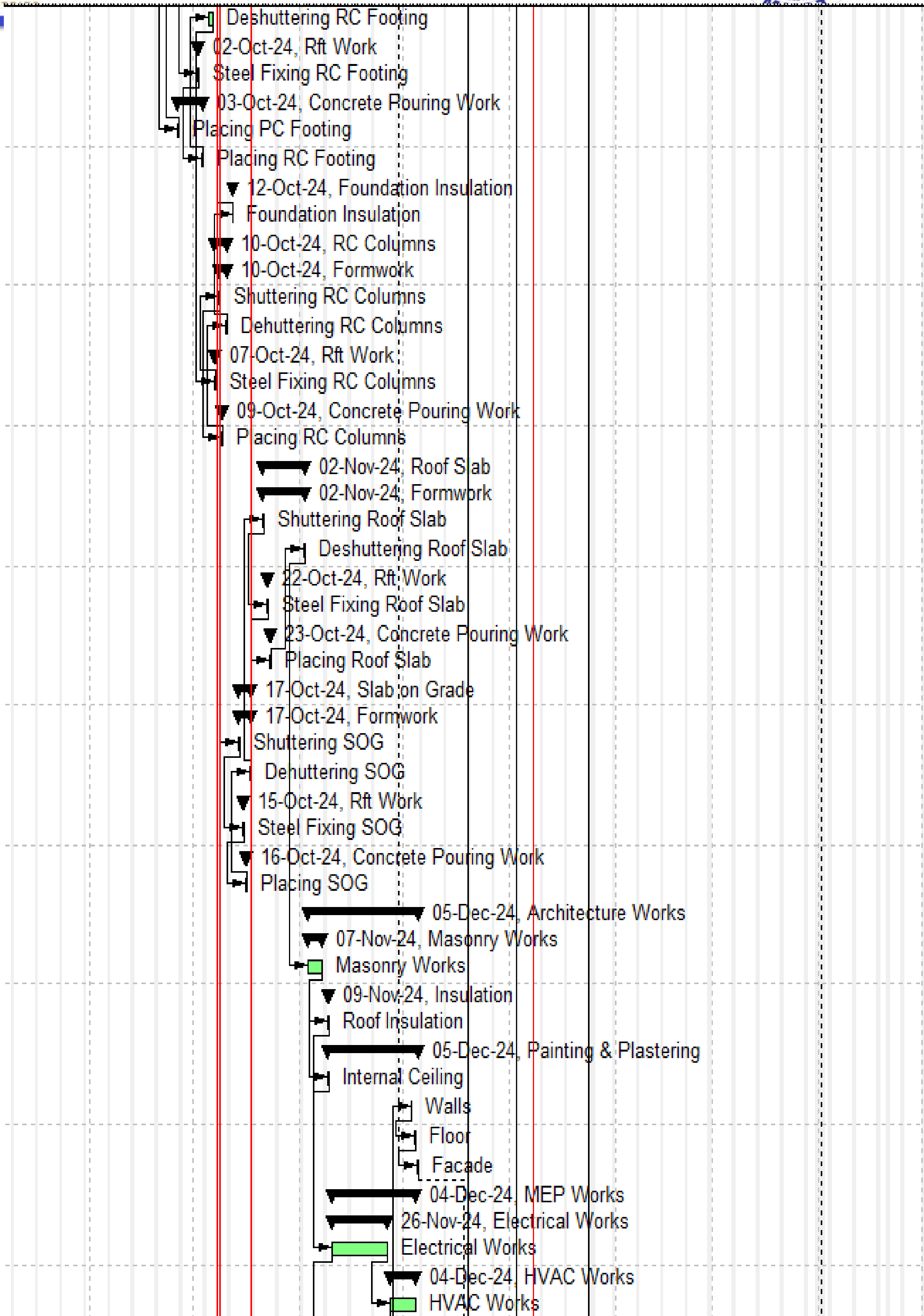

Deshuttering PC Footing
Shuttering RC Footing
Deshuttering RC Footing
04-Aug-24, Rft Work
Steel Fixing RC Footing
05-Aug-24, Concrete Pouring Work
Placing PC Footing
Placing RC Footing
24-Aug-24, Pedestals
24-Aug-24, Formwork
Shuttering Pedestals
Dehuttering Pedestals
14-Aug-24, Rft Work
Steel Fixing Pedestals
21-Aug-24, Concrete Pouring Work
First Placing Pedestals
Second Placing Pedestals
27-Aug-24, Foundation Insulation
Foundation Insulation
05-Nov-24, Super Strucure
22-Oct-24, Ground Floor
22-Oct-24, Civil Works
24-Sep-24, Steel Works
24-Sep-24, Steel Structure Erection
15-Sep-24, Steel Columns
Anchor Bolts and Plates
Installing Columns
16-Sep-24, Steel Beams
Installing Steel Beams
24-Sep-24, Metal Deck
Installing Metal Decks
22-Oct-24, Concrete Works
20-Oct-24, RC Columns
20-Oct-24, Formwork
Shuttering RC Columns
Dehuttering RC Columns
08-Oct-24, Rft Work
Steel Fixing RC Columns
17-Oct-24, Concrete Pouring Work
Placing RC Columns
22-Oct-24, Slab on Grade
22-Oct-24, Formwork
Shuttering SOG
Dehuttering SOG
12-Oct-24, Rft Work
Steel Fixing SOG
21-Oct-24, Concrete Pouring Work
Placing SOG


28-Oct-24, 1st Floor
28-Oct-24, Civil Works
05-Oct-24, Steel Works
05-Oct-24, Steel Structure Erection
25-Sep-24, Steel Columns
Installing Columns
26-Sep-24, Steel Beams
Installing Steel Beams
05-Oct-24, Metal Deck
Installing Metal Decks
28-Oct-24, Concrete Works
28-Oct-24, RC Columns
28-Oct-24, Formwork
Shuttering RC Columns
Dehuttering RC Columns
21-Oct-24, Rft Work
Steel Fixing RC Columns
26-Oct-24, Concrete Pouring Work
Placing RC Columns
22-Oct-24, Slab on Grade
22-Oct-24, Formwork
Shuttering SOG
Dehuttering SOG
14-Oct-24, Rft Work
Steel Fixing SOG
21-Oct-24, Concrete Pouring Work
Placing SOG
05-Nov-24, 2nd Floor
05-Nov-24, Civil Works
07-Oct-24, Steel Works
07-Oct-24, Steel Structure Erection
06-Oct-24, Steel Columns
Installing Columns
07-Oct-24, Steel Bems
Installing Steel Beams
05-Nov-24, Concrete Works
05-Nov-24, RC Columns
05-Nov-24, Formwork
Shuttering RC Columns
Dehuttering RC Columns
29-Oct-24, Rft Work
Steel Fixing RC Columns
03-Nov-24, Concrete Pouring Work
Placing RC Columns
22-Oct-24, Slab on Grade
22-Oct-24, Formwork
Shuttering SOG
Dehuttering SOG

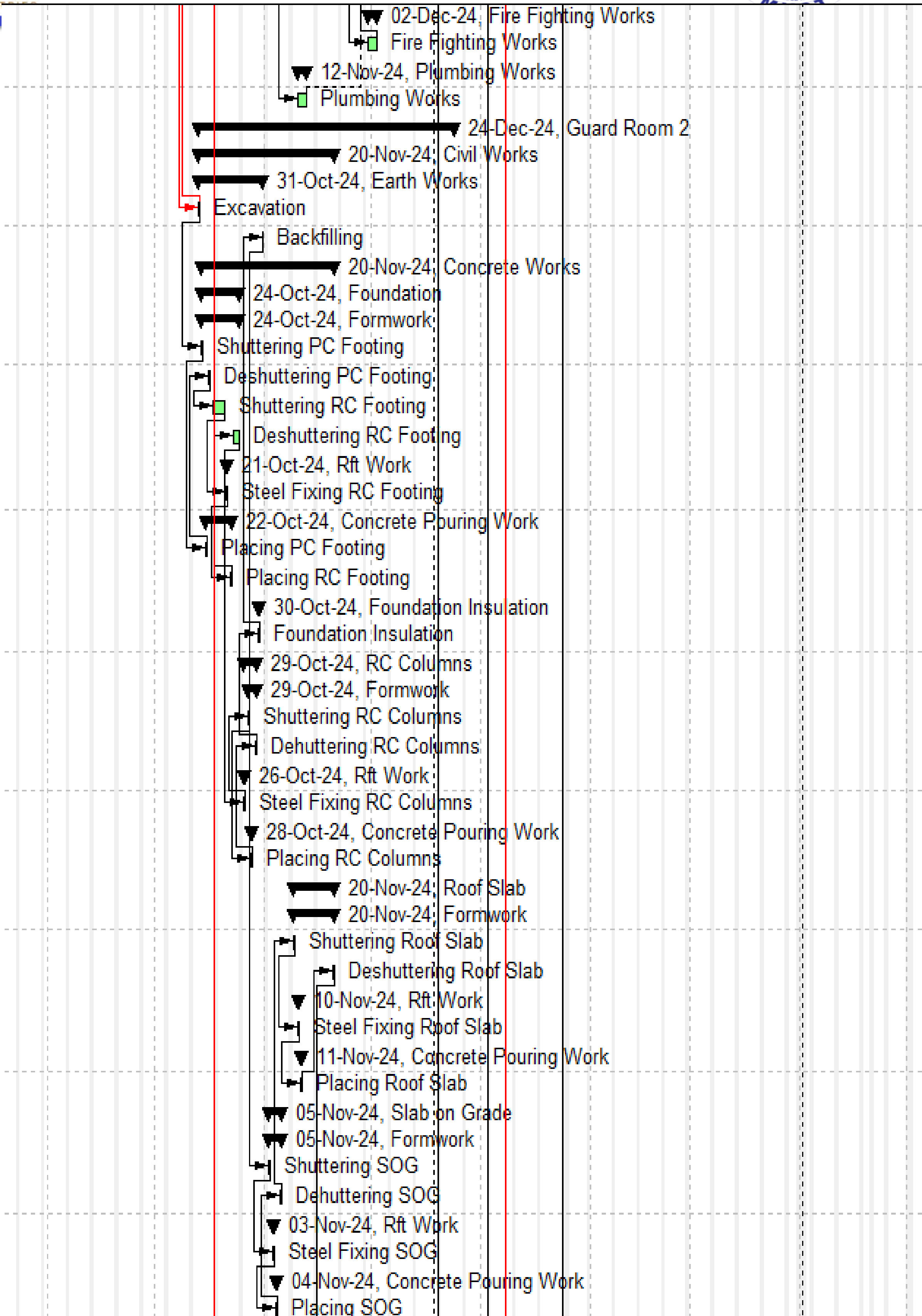

16-Oct-24, Rft Work
Steel Fixing SOG
21-Oct-24, Concrete Pouring Work
Placing SOG
04-Feb-25, Architecture Works
19-Nov-24, Masonry Works
Masonry Works
04-Feb-25, Aluminum & Metal Works
Aliminum Doors
Metal Doors
Facade Aliminum
25-Dec-24, Painting & Plastering
Internal Walls
Internal Floor
31-Dec-24, MEP Works
31-Dec-24, Electrical Works
09-Dec-24, 1st fix
Electrical first fix
Light current first fix
Electric cabling
Light current cables
31-Dec-24, 2nd fix
Wiring devices
Light current fixtures & equipment
Fire Alarm System
Lighting fixtures
14-Dec-24, HVAC Works
27-Nov-24, 1st fix
Ducts Works
Piping Works
Split units
14-Dec-24, 2nd fix
Fans installation
Diffusers & Grills
14-Dec-24, Fire Fighting Works
14-Dec-24, 1st fix
Piping & Valves Works
Sprinklers
09-Dec-24, 2nd fix
Fire hose cabinets
Fire Extinguishers
09-Dec-24, Plumbing Works
27-Nov-24, 1st fix
Piping Works
09-Dec-24, 2nd fix
Plumbing Fixtures
Floor Drains & Cleanout

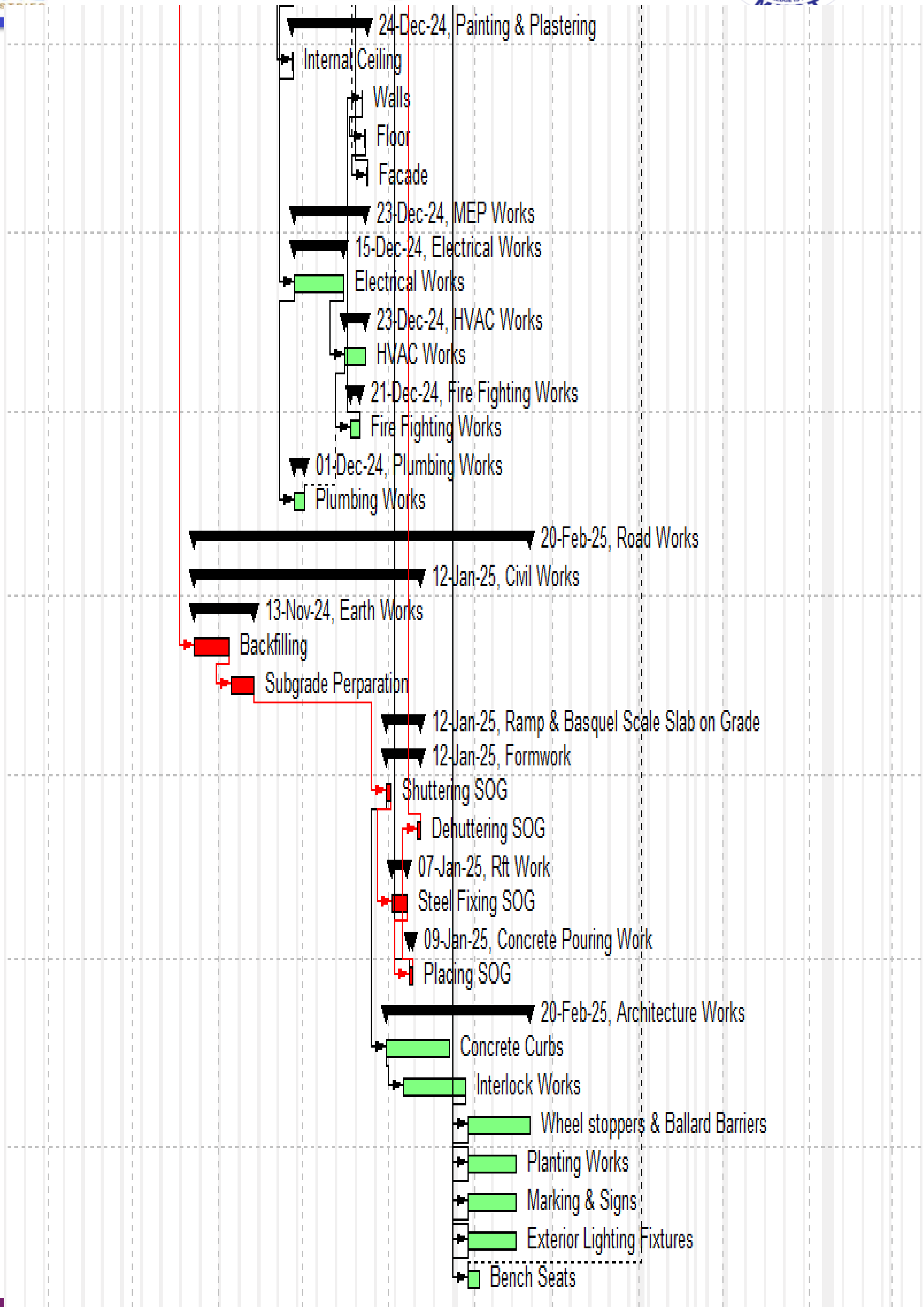


17-Apr-25, Fences & Guard Rooms
17-Apr-25, Fence
30-Jan-25, Civil Works
30-Jan-25, Earth Works
Excavation
Backfilling
22-Jan-25, Concrete Works
21-Nov-24, Foundation
21-Nov-24, Formwork
Shuttering PC Footing
Deshuttering PC Footing
Shuttering RC Footing
Deshuttering RC Footing
13-Nov-24, Rft Work
Steel Fixing RC Footing
14-Nov-24, Concrete Pouring Work
Placing PC Footing
Placing RC Footing
22-Jan-25, Foundation Insulation
Foundation Insulation
19-Jan-25, RC Columns
19-Jan-25, Formwork
Shuttering RC Columns
Dehuttering RC Columns
26-Nov-24, Rft Work
Steel Fixing RC Columns
14-Jan-25, Concrete Pouring Work
Placing RC Columns
17-Apr-25, Architecture Works
24-Mar-25, Masonry Works
Masonry Works
17-Apr-25, Gates Erection
Metal Doors Fixation
06-Apr-25, Painting and Plastering
Painting and Plastering
24-Dec-24, Guard Rooms
05-Dec-24, Guard Room 1
02-Nov-24, Civil Works
13-Oct-24, Earth Works
Excavation
Backfilling
02-Nov-24, Concrete Works
06-Oct-24, Foundation
06-Oct-24, Formwork
Shuttering PC Footing
Deshuttering PC Footing
Shuttering RC Footing



Deshuttering RC Footing
02-Oct-24, Rft Work
Steel Fixing RC Footing
03-Oct-24, Concrete Pouring Work
Placing PC Footing
Placing RC Footing
12-Oct-24, Foundation Insulation
Foundation Insulation
10-Oct-24, RC Columns
10-Oct-24, Formwork
Shuttering RC Columns
Dehuttering RC Columns
07-Oct-24, Rft Work
Steel Fixing RC Columns
09-Oct-24, Concrete Pouring Work
Placing RC Columns
02-Nov-24, Roof Slab
02-Nov-24, Formwork
Shuttering Roof Slab
Deshuttering Roof Slab
22-Oct-24, Rft Work
Steel Fixing Roof Slab
23-Oct-24, Concrete Pouring Work
Placing Roof Slab
17-Oct-24, Slab on Grade
17-Oct-24, Formwork
Shuttering SOG
Dehuttering SOG
15-Oct-24, Rft Work
Steel Fixing SOG
16-Oct-24, Concrete Pouring Work
Placing SOG
05-Dec-24, Architecture Works
07-Nov-24, Masonry Works
Masonry Works
09-Nov-24, Insulation
Roof Insulation
05-Dec-24, Painting & Plastering
Internal Ceiling
Walls
Floor
Facade
04-Dec-24, MEP Works
26-Nov-24, Electrical Works
Electrical Works
04-Dec-24, HVAC Works
HVAC Works


02-Dec-24, Fire Fighting Works
Fire Fighting Works
12-Nov-24, Plumbing Works
Plumbing Works
24-Dec-24, Guard Room 2
20-Nov-24, Civil Works
31-Oct-24, Earth Works
Excavation
Backfilling
20-Nov-24, Concrete Works
24-Oct-24, Foundation
24-Oct-24, Formwork
Shuttering PC Footing
Deshuttering PC Footing
Shuttering RC Footing
Deshuttering RC Footing
21-Oct-24, Rft Work
Steel Fixing RC Footing
22-Oct-24, Concrete Pouring Work
Placing PC Footing
Placing RC Footing
30-Oct-24, Foundation Insulation
Foundation Insulation
29-Oct-24, RC Columns
29-Oct-24, Formwork
Shuttering RC Columns
Dehuttering RC Columns
26-Oct-24, Rft Work
Steel Fixing RC Columns
28-Oct-24, Concrete Pouring Work
Placing RC Columns
20-Nov-24, Roof Slab
20-Nov-24, Formwork
Shuttering Roof Slab
Deshuttering Roof Slab
10-Nov-24, Rft Work
Steel Fixing Roof Slab
11-Nov-24, Concrete Pouring Work
Placing Roof Slab
05-Nov-24, Slab on Grade
05-Nov-24, Formwork
Shuttering SOG
Dehuttering SOG
03-Nov-24, Rft Work
Steel Fixing SOG
04-Nov-24, Concrete Pouring Work
Placing SOG


24-Dec-24, Painting & Plastering
Internal Ceiling
Walls
Floor
Facade
23-Dec-24, MEP Works
15-Dec-24, Electrical Works
Electrical Works
23-Dec-24, HVAC Works
HVAC Works
21-Dec-24, Fire Fighting Works
Fire Fighting Works
01-Dec-24, Plumbing Works
Plumbing Works
20-Feb-25, Road Works
12-Jan-25, Civil Works
13-Nov-24, Earth Works
Backfilling
Subgrade Perparation
12-Jan-25, Ramp & Basquel Scale Slab on Grade
12-Jan-25, Formwork
Shuttering SOG
Dehuttering SOG
07-Jan-25, Rft Work
Steel Fixing SOG
09-Jan-25, Concrete Pouring Work
Placing SOG
20-Feb-25, Architecture Works
Concrete Curbs
Interlock Works
Wheel stoppers & Ballard Barriers
Planting Works
Marking & Signs
Exterior Lighting Fixtures
Bench Seats

Konning Food Industries

Thank you

Spring 2025

SYNOPSIS

“In this Gradation Project book we discuss and explore the questions and challenges from the prospective of the construction Planning team and the ways to overcome these challenges and answer these questions. The sizable project of the Three Sixty Mall located in the fifth settlement in Cairo Governorate, Egypt is taken as the case study in this book. The planner is responsible for every aspect of the project pre-, during and even after the commencing of the construction project therefore he’s faced by different situations that requires fast responses and an open mind. So in the six chapters of this book we try to make humble tackling of what does it mean to be a project planner and what is the skills and knowledge needed in order to become as successful one”